



Journal of
**STUDENT RESEARCH
2004 ABSTRACTS**
Volume IX

Journal of
STUDENT RESEARCH
2004 ABSTRACTS
Volume IX

Editor

Steven B. Oppenheimer

California State University, Northridge,
California

PEARSON
Education

Copyright © 2004, 2003 by Pearson Education, Inc.
Copyright © 2001, 2000, 1998 by Burgess International Group, Inc.
All rights reserved.

Permission in writing must be obtained from the publisher before any part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system.

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

ISBN 0-536-81847-9

2004140014

AK

Please visit our web site at www.pearsoned.com



PEARSON EDUCATION
Upper Saddle River, New Jersey 07458

JOURNAL OF STUDENT RESEARCH ABSTRACTS

Volume IX, 2004

An Annual Journal for Young Investigators and their Teachers

STAFF

Editor-In-Chief

Steven B. Oppenheimer, Ph.D.,
Director, Center for Cancer & Developmental Biology and Trustees Outstanding Professor,
The CSU system. California State University, Northridge.

Associate Editor

Helen Chun, Ph.D., University of California, Los Angeles

SPONSORSHIP

Improving Teacher Quality State Grant Program (No Child Left Behind Act of 2001, Title II,
Part A)

Dwight D. Eisenhower Professional Development State Grant Program

National Science Foundation, Teacher Enhancement program, ESIE

California Science Project

Joseph Drown Foundation

California State University, Northridge, College of Science and Mathematics, Department of
Biology, Center for Cancer and Developmental Biology (Jolene Koester, President;
Louanne Kennedy, Provost; Linda Bain, Interim Provost; Philip Handler, Vice Provost;
Mack Johnson, Assoc. Vice President)

PROGRAM ASSISTANCE AND SUPPORT

Linda Barton White, Robert Moore, Tammie Denyse, Howard Levine (Improving Teacher
Quality and Eisenhower State Grant Programs)

Maria Lopez Freeman (California Science Project)

Edward Carroll, Dean, College of Science and Mathematics; Kavos Blourtchi, Karen Bilsky,
Barbara Caretto, Matt Rinnert, Shefali Desai (Dean's Office), Nancy Bishop, William
Krohmer, Jan Volbeda, Cielo Harding, Biology Department

Don Kawano, Los Angeles Unified School District (LAUSD), Science Advisor

Debbie Leidner, Superintendent, LAUSD District A

Judy Burton, Superintendent, LAUSD District B

Training Program Leaders:

Steven Oppenheimer, Gerry Simila, Gini Vandergon, Norm Herr, Tony Recalde

Recognition of Scientist Mentors, Los Angeles Area National Science Foundation and Eisenhower Sponsored Research Experiences Program

Larry Allen, Ph.D., Lisa Banner, Ph.D., Larry Baresi, Ph.D., Edward Carroll, Ph.D., Randy Cohen, Ph.D., John Colicelli, Ph.D., Mary Corcoran, Ph.D., Cathy Coyle-Thompson, Ph.D., Steve Dudgeon, Ph.D., Robert Espinoza, Ph.D., Richard Flagan, Ph.D., Janet Kübler, Ph.D., Jennifer Matos, Ph.D., Aida Metzenberg, Ph.D., Stan Metzenberg, Ph.D., Steve Oppenheimer, Ph.D., Polly Schiffman, Ph.D., Ryoichi Seki, Ph.D., Gerry Simila, Ph.D., Mary Lee Sparling, Ph.D., Mike Summers, Ph.D., Paul Tomasek, Ph.D., Paul Wilson, Ph.D., Maria Elena Zavala, Ph.D., Ryoichi Seki, Ph.D., Peter Weigand, Ph.D., George Dunne, Ph.D., Kathie Marsaglia, Ph.D., Vicki Pedone, Ph.D., Greg Grether, Ph.D., David Epel, Ph.D. (Evaluation), Susie Hakansson, Ph.D. (Evaluation), Norman Herr, Ph.D. (Implementation).

ABOUT THE EDITOR

Steven B. Oppenheimer received the Ph.D. degree from Johns Hopkins University and is currently Professor of Biology and Director of the Center for Cancer and Developmental Biology at California State University, Northridge. He is author or co-author, mostly with his Cal State students, of about 200 publications including 10 books and book editions, was awarded over \$6 million in research and science education grants serving as Principal Investigator, and served on National Institutes of Health and National Science Foundation grant review panels. He serves on the editorial board of the international journal *ACTA Histochemica*. He is recipient of 21 distinguished teaching awards, distinguished research awards, outstanding professor awards and other honors from local, statewide and national organizations. In 1984, he was named statewide Trustees Outstanding Professor of the California State University system (the system's highest honor), and in 1992 he was elected Fellow of the American Association for the Advancement of Science (AAAS). The AAAS defines a Fellow as "a member whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished."

Editor's e-mail address: steven.oppenheimer@csun.edu

ABOUT THE JOURNAL AND SUBMISSION OF ABSTRACTS

The Journal of Student Research Abstracts is published yearly on or about May 1 by Pearson Education. Continued Publication is always dependent on funding.

The journal is intended to provide students and teachers with: (1) a vehicle to honor young investigators and their teachers by showcasing their work, motivating them to continue their involvement in research science, (2) a sourcebook for both students and teachers who are looking for ideas for research projects, and (3) a volume to disseminate student research discoveries. Many abstracts included in the journal demonstrate good science, i.e., clear introductions describing hypothesis to be tested, methods, results and conclusion statements, and most important, sufficient numbers of appropriate control and experimental samples and repetitions of experiments. Other abstracts do not display one or more of the principles of perfect science. We do not eliminate abstracts that do not demonstrate perfect science. The editor, however,

reviews all abstracts and reserves the right not to publish abstracts that are seriously flawed. Those abstracts were deleted from this issue. We do not notify authors if their abstracts have been deleted. Some of the abstracts are experimental plans instead of completed projects. This is especially true in the case of long term, sophisticated research programs that require extensive set-up and planning. The journal encourages abstracts on the planning and progress of such projects. Any opinions, findings, and conclusions or recommendations are those of the individual authors of the abstracts presented in the journal, and do not necessarily reflect the views of the National Science Foundation, Improving Teacher Quality Program, Eisenhower program, the other sponsoring agencies, the university or the journal staff.

SUBMISSION OF ABSTRACTS

Any science teacher may submit student abstracts following the exact format given in the abstracts in this volume. After the title (in caps), followed by student author names and teacher name (teacher), school and school street address, city, state and zip, abstracts should begin (after a 3 space indentation) with the purpose of the study, followed by how it was done, the results and conclusions. All abstracts must be typed neatly, error free. Messy abstracts and those not following proper format will be discarded. The journal is not responsible for any abstracts received or for publication errors. Students and teachers are advised to photocopy abstracts before mailing. We do not acknowledge receipt of abstracts.

Only teachers may submit their students' abstracts to the journal. They should be mailed along with a cover letter on school letterhead to: Dr. Steven Oppenheimer, Editor, Journal of Student Research Abstracts, Center for Cancer & Developmental Biology, California State University, Northridge, 18111 Nordhoff Street, Northridge, CA 91330-8303. Deadline for receipt of abstracts for each annual volume is February 1, but an issue may be closed at an earlier date. Abstracts received after the deadline or those accepted after the volume fills will be held for consideration for the next issue. There is no guarantee that the journal will be published in any given year. Submitted abstracts are not returned to authors and the only confirmation that they will be published is if they appear in print. Supplies permitting, a complimentary copy of the journal will be sent to teachers whose students' abstracts are published in that volume. **If students, parents or principals wish a copy of the journal, a \$25 check per copy, payable to CSUN Foundation, Center for Cancer and Developmental Biology must be mailed along with the abstract.**

STUDENT ABSTRACT INDEX

Number following name refers to abstract number

- Aames, J., 2983
Abramyan, L., 3198
Acevedo, N., 3195
Acevedo, S., 3207
Acuna, L., 3042
Adigheji, B., 3031
Agosto, A., 3053
Aguilar, M., 3190
Aguilar, S., 3053
Aguirre, J., 3050
Aivazova, N., 2999
Akram, E., 3053
Alagot, C.B., 3057
Alba, B., 2988
Albarran, E., 3194
Alberto, M., 2992, 3002
Alder, J., 3053
Alfonzo, J., 3053
Almasian, S., 3199
Alonso, T., 3031
Alvarez, E., 3010
Alves, M., 3102
Amaya, K., 3176
Andrade, C., 3053
Andre, V., 3199
Anguiano, H., 3053
Aniciete, L., 3184
Aquino, B., 3194
Araiza, V., 3042
Arambula, L., 3176
Archila, O., 2992, 3002
Archila, O., 3053
Argueta, E., 3053
Arias, A., 2988
Arias, V., 3194
Arman, A., 3010
Arriaga, A., 3013
Arroyo, R., 3205
Arteaga, H., 3053
Arzate, I., 3045
Avalos, E., 3050
Avenisyan, A., 3078
Avila, F., 3053
Avina, C., 3194
Avina, L., 3053
Avitia, F., 2992, 3002
Ayala, C., 3194
Ayon, R., 3078
Backwell, L., 3053
Bae, J., 3189
Baek, E., 3053
Bagamaspad, A., 3106
Bain, S., 2980
Ball, J., 3193
Baneulos, L., 3053
Barraza, O., 3001
Becerra, J., 3053
Belloso, J., 3194
Beltran, A., 3078
Ben-Ari, L., 3193
Benitez, S., 3176
Benito, W., 3031
Bernal, B., 3155
Berumen, E., 3194
Bethancourt, G., 3053
Bhangal, A., 3001
Billoo, A., 3030
Birke, R., 2986
Birur, E., 3208
Bleaman, I., 3060
Bon, J., 3194
Bonilla, J., 2980
Bonushkin, P., 3086
Borreul, A., 3193
Bosnich, A., 3046
Bourenane, K., 3210
Boyd, J., 3042
Brostoff, B., 3021
Brown, T., 3042
Bruner, J., 3042
Buenrostro, A., 3176
Bustamante, J., 3053
Bustamante, V., 3053
Cabrera, S., 3053
Cadiz, B., 3016
Calderon, C., 3031
Callahan, M., 3195
Callahan, M., 3203
Callahan, T., 3081
Camunas, N., 3195
Candelaria, J., 3207
Cannon, S., 3087
Carranza, K., 3055
Carreon, L., 3009
Carrillo, Y., 3195
Carvajal, E., 3031
Casarez, L., 3053
Castellanos, R., 3042
Castillo A., 3030
Castillo, H., 3176
Castillo, J., 3194
Castillo, L., 3053
Castillo, S., 3195
Castrellon, L., 3194
Castro, V., 3053
Celis, G., 2992, 3002
Cerniglia, C., 3182
Cervantes, C., 3053
Cervantes, S., 3143
Chan, M., 3035
Chapman, A., 2984
Chavez, V., 3055
Chavez, V., 3195
Chen, A., 3195
Chen, J., 2997
Chin, J., 3158
Chinchilla, J., 3090
Chiu, M., 3166
Cho, D., 3073
Cho, J., 3189

- Choi, E., 3051
Choi, P., 3165
Chu, A., 3193
Chua, J., 2983
Chuang, K., 3142
Cienguegos, C., 3053
Cisneros, S., 3184
Coburn, A., 2991
Cohen, D., 3014
Cohen, J., 3074
Coleman, D., 3005
Contreras, C., 3053
Contreras, D., 3053
Cordero, J., 3042
Cordova, M., 3053
Cordova, R., 3176
Cortez, R., 3194
Crenshaw, R., 3049
Crittenden, T., 3042
Cruz, J., 3023
Cruz, J., 3053
Cruz, J., 3053
Cruz, J., 3078
Cruz, T., 2988
Cuellar, P., 3053
Cueva, J., 3053
Cuevas, J., 3194
Cueves, E., 2999
de Alba, R., 3098
De Barge, R., 3053
De Castro, S., 3194
De La Cruz, A., 2986
De La Cruz, A., 3078
De La Torre, 3053
De Leon, J., 3053
De Nisco, N., 2995
de Sosa, D., 3121
De Vera, D., 3195
del Rio, A., 3108
Dela Cruz, J., 3208
Delgado, E., 3176
Delgado, G., 3161
Delgado, L., 3031
Dermendjian, L., 3053
Desamito, K., 2983
Diaz, O., 2992, 3002
Diep, M., 2985
Diep, M., 3072
Diep, T., 3075
Dindji, E., 3191
Dinh, J., 3078
Dinka, J., 3013
Dishlaryan, H., 3047
Donnelly, T., 3063
Dorado, L., 3053
Dorman, D., 3052
Duran, J., 3042
Dy, C., 3097
Edelberg, D.A., 3201
Edwards, A., 3063
Elenes, J., 3194
El-Fakih, N., 3202
Enright, K., 3195
Escobar, A., 3031
Espejel, M., 3195
Espinoza, J., 2992, 3002
Estrada Jr., E., 3176
Estrada, A., 3194
Estrada-Ugalde, K., 3195
Evangelista, K., 3193
Ewing, Z., 3160
Ezzati, V., 2980
Fanchiang, E., 3096
Felix, C., 3194
Fernandez, J., 3031
Ferrero, J., 3082
Figueroa, A., 3053
Figueroa, C., 3031
Fiorani, G., 3082
Flores, E., 3013
Foust, J., 3078
Fowler, N., 3064
Fox, J.C., 3052
Frankian, C., 2980
Fu, C., 2979
Gaffar, S., 3179
Galdamez, C., 3194
Galicia, D., 3209
Galindo, J., 3204
Gallegos, J., 3194
Gallegos, S., 3053
Galvan, Y., 3195
Galvez, G., 3043
Garay, C., 3031
Garcia, A., 3194
Garcia, C., 3194
Garcia, C., 3194
Garcia, I., 3061
Garcia, J., 3014
Garcia, M., 3195
Garcia, N., 3053
Garcia, O., 3053
Garcia, R., 3015
Garcia, R., 3031
Garcia, R., 3105
Gargano, N., 3200
Garza, L., 3053
Gasparyan, A., 2980
Gatus, K., 3195
Gelzer, J.M., 3033
Genchel, M., 3089
Gevoglanyan, S., 3077
Gharibans, A., 3101
Gharibian, C., 2980
Gharibian, K., 2980
Gibson, D., 3043
Goldstein, Z., 3140
Gomez, L., 3053
Gomez, R., 3169
Goni, A., 2988
Gonzalez, A., 3053
Gonzalez, E., 3042
Gonzalez, J., 3003
Gonzalez, J., 3031
Gonzalez, M., 3161
Goodwin, D., 3053
Gordillo, H., 3053
Gordon, H., 3053
Gordon, S., 2991
Gramajo, C., 2986
Gramajo, C., 3078
Green, T., 3042

- Griego, G., 3026
Griffin, A., 2994
Grimes, J., 3082
Grover, G., 3053
Grubman, E., 3148
Guardado, J., 3176
Guardado, P., 3053
Gutierrez, C., 3053
Gutierrez, E., 3078
Gutierrez, F., 3176
Gutierrez, J., 3082
Gutierrez, J., 3193
Gutterman, J., 3124
Guzman, J., 3045
Guzman, J., 3190
H, J., 3138
Hanson, B., 3107
Harrison, A., 3005
Hayrapetyan, L., 3053
Hendifar, K., 3078
Hermoso, I., 3194
Hermoso, I., 3197
Hernandez, E., 3191
Hernandez, I., 3053
Hernandez, J., 3061
Hernandez, J., 3195
Hernandez, J., 3195
Hernandez, J., 3195
Hernandez, K., 3195
Hernandez, L., 3031
Hernandez, M., 2988
Hernandez, M., 3013
Herrera, A., 3053
Herrera, L., 3042
Hielscher, M., 3172
Higuera, M., 3053
Hirako, A., 3191
Hittleman, I., 3040
Ho, J., 2980
Hollander, M., 3193
Hong, E., 3093
Hong, M., 2999
Hopkins, D., 3031
Hovivian, R., 3193
Hughes, K., 3078
Huitzil, C., 3103
Hwang, C., 3206
Hwang, S., 3076
Ibarra, E., 3188
Im, D., 3154
Im, M., 3162
Im, Y., 3144
Impellizine, R., 3013
Israel, C., 3098
Itzep, C., 3194
Jacinto, D., 3195
Jacinto, D., 3203
Jackson, J., 3043
Jacobson, G., 3082
Jahanbin, A., 3193
Jimenez, F., 2992, 3002
Johnson, C., 3042
Johnson, J., 3020
Johnson, S., 3176
Jones, T., 3078
Juarez, A., 3063
Juarez, B., 3063
Juarez, J., 2992, 3002
Jurado, J., 2992, 3002
Kailany, J., 3195
Kang, T., 3191
Karapetyan, Y., 3047
Kelley, A., 3078
Kharimian, A., 3053
Kilpatrick, C., 2980
Kim, A., 3114
Kim, B., 3065
Kim, C., 3191
Kim, I., 3109
Kim, M.S., 3129
King, G., 3013
Klebanov, N., 3193
Knight, B., 3078
Ko, J., 3192
Koffi, B., 3014
Kogan, K., 3178
Kolahi, K., 3105
Koretz, Z., 3117
Kumar, S., 3175
Kuschner, A.K., 3170
La Brasca, J., 3092
Lacey, K., 3053
Lahsaei, G., 3122
Lailson, 3053
Lam, C., 3195
Lam, H., 3211
Landau, S., 3113
Lasky, R.J., 3187
Law, E., 3068
Le, D.T., 3044
Lee, B., 3126
Lee, J., 3095
Lee, J., 3178
Lee, K., 3088
Lee, L., 3039
Lee, P., 3195
Lee, Y., 3029
Lennox, D., 3052
Leon, D., 3176
Lerner-Byars, T., 3091
Leslie, S., 3151
Leu, D., 3115
Leung, T., 3156
Lieberman, A., 3014
Lindsay, S., 3078
Litvak, D., 3164
Litvinchuk, A., 3058
Liu, J., 3116
Livingston, S., 3134
Liyanto, B., 3123
Llamas, Y., 2992, 3002
Lopez, J., 2986
Lopez, L., 3053
Lopez, M., 3053
Lopez, M., 3053
Louie, K., 3059
Low, P., 3183
Lowensohn, E., 2982
Luc, S., 3177
Lucario, B., 3031
Lucerne, D., 3031
Lujan, C., 3195
Lukiman, M., 3019

- Luna, C., 3031
Luviano, L., 3194
Maadelat, A., 3004
Macias, L., 2992, 3002
Mahdessian, A., 2980
Manuel, V., 3053
Margolis, J., 3135
Mariano, F., 3031
Mariscal, R., 2992, 3002
Mariscal, V., 3053
Marquez, G., 3053
Marroquin, F., 3053
Marroquin, S., 3078
Marshall, C., 3031
Martin, A., 3181
Martin, J., 2988
Martinez, J., 3176
Martinez, K., 2992, 3002
Martinez, N., 3053
Martinez, V., 3188
Martinez, W., 3053
Marton, K., 3071
Mashruf Yasdani, F.M., 3147
Masson, R., 3146
Mateescu, I., 3105
Matos, J., 3027
Mazariegos, K., 3053
McGrath, M., 3066
Medina, M., 3053
Medrano, M., 3053
Melancon, N., 3011
Mendell, P., 3112
Mendez, J., 3195
Mendez, R., 3013
Mendonza, V., 3042
Mendoza, A., 3194
Mendoza, B., 3190
Mendoza, J., 3184
Mendoza, R., 3078
Mercado, A., 3195
Mercedo, D., 3194
Merlin, K., 3053
Meza, J., 3194
Milazzo, H., 3041
Mills, E., 3168
Miramontes, R., 3195
Miranda, K., 3194
Miranda, M., 3098
Mirchi, D., 3007
Mirzayan, M., 2980
Misra, S., 3131
Molgora, B., 3204
Molina, L., 2988
Molina, L., 3053
Molina, M., 3053
Mora, G., 3013
Morales, A., 3045
Morales, J., 2999
Moran, L., 3193
Moreno, J., 2992, 3002
Moreno, N., 3078
Morente, S., 3078
Morris, M., 3173
Morris, W., 3078
Morse, O., 3053
Mosqueda, S., 2992, 3002
Mota, B., 3031
Moz, B., 3078
Muhannad, I., 2992, 3002
Munn, A., 3013
Munoz, C., 2992, 3002
Na, M., 3157
Nameth, J., 3193
Naqvi, S., 3194
Narcisse, B., 3176
Nash, K., 3105
Navarro, B., 3053
Navid, V., 3195
Nazer, N., 3028
Negrete, B., 3176
Nettles, B., 3062
Ngai, O., 3209
Nguyen, H., 2992, 3002
Nguyen, I.H., 3159
Nunez, J., 3176
Nunez, K., 3053
O'Connor, S., 3137
Ochoa, J., 3176
Oldach, J., 3104
Oliveros, R., 3013
Olmedo, K., 3053
Orbin, A., 3120
Orellana, C., 3194
Ortega, J., 3042
Ortega, L., 2980
Ortiz, D., 2992, 3002
Osorio, J., 2999
Ostovich, A.W., 3084
Ovadia, T., 3110
Owens, P., 3133
Pacheco, D., 3053
Padilla, R., 3176
Pai, J., 3193
Palma, F., 2983
Park, D., 2987
Park, K., 3153
Partida, A., 3034
Pascua, D., 3194
Pastuska, M., 3182
Patterson, M., 3053
Paz, C., 3053
Pedroza, V., 3205
Pelacios, E., 3191
Pena, J., 3053
Penaloza, M., 3176
Perea, H., 3053
Pereyra, A., 3013
Perez, D., 2992, 3002
Perez, K., 3194
Pezeshkian, A., 3101
Pilavian, A., 3043
Pilossyan, L., 3047
Pittman, S., 2994
Placencia, J., 3053
Podzharyy, A., 3053
Pol, S., 3013
Polanco, L., 3195
Polizos, N., 3193
Ponce, A., 3195
Prado, J., 3080
Prepelitsky, D., 3150
Prieto, B., 3013

- Proudian, A., 3043
Pua, J., 2988
Puma, H., 3053
Quintanilla, R., 3194
Quintero, A., 3053
Rahimi, A., 3078
Ramirez, A., 3031
Ramirez, E., 2988
Ramirez, R., 3078
Ramirez, V., 2992, 3002
Rangel, L., 3176
Rauen, S., 3200
Rayo, C., 3031
Rendon, D.M., 3008
Renken, B., 2983
Reynoso, C., 3082
Rios, A., 3053
Ritter, Z., 3105
Rivera, J., 2992, 3002
Rivera, J., 3053
Rivera, L., 3195
Robledo, D., 3053
Rodas, J., 3053
Rodriguez, H., 3053
Rodrigues, A., 3176
Rodriguez, A., 2992, 3002
Rodriguez, D., 2992, 3002
Rodriguez, E., 3194
Rodriguez, J., 3042
Rodriguez, J., 3098
Rodriguez, L., 3053
Rodriguez, M.M., 3180
Rojo, E., 3053
Roma, E., 3053
Roman, J., 3195
Romero, E., 3053
Romero, L., 3053
Romero, R., 3053
Rosales, C., 3078
Rubin, J., 3079
Rutherford, C.R., 3174
Saavedra, D., 3176
Salazar, B., 3195
Salazar, I., 3195
Salazar, J., 3053
Salcido, E., 3013
Saldivar, R., 3053
Salgado, J., 3053
Salinas, L., 2992, 3002
Salmeron, Y., 3017
Samsonidze, M., 3053
Sanchez, B., 3009
Sanchez, G., 3053
Sanchez, J., 3053
Sanchez, J., 3194
Sanchez, M., 3176
Sanchez, R., 2992, 3002
Sandoval, A., 3053
Sandoval, A., 3194
Sangkhae, V., 3054
Santizo, M., 3078
Sardaryan, B., 3031
Sarebanha, M., 2981
Sarode, R., 3067
Sarwary, A., 2985
Scruggs, M., 3176
Segrist, T., 3182
Selaya, E., 3152
Sen, A., 3017
Serber, A., 3193
Serrano, T., 3194
Session, J., 3053
Shen, K., 3006
Shen, S.A., 3185
Shih, A., 3038
Shikai, C., 3032
Shin, B., 3085
Shin, J., 3125
Shin, J., 3196
Shishkina, M., 3043
Shklyar, I., 3193
Shuai, S., 2996
Shulman, M., 3056
Shvarts, E., 3048
Sierra, K., 3139
Siguenza, K., 3045
Sikka, P., 2980
Silva, A., 3053
Silva, O., 3176
Singh, J., 2992, 3002
Sione, J.J., 3053
Sire, C., 3053
Sloan, L., 3195
Smith, S., 3053
Solares, N., 3016
Solorzano, H., 3053
Sotelo, W., 3193
Spaprudin, M., 3042
Spector, S., 3171
Springstead, A., 3053
Steinfeld, M., 3001
Stern, R., 3127
Stokes, A., 3119
Stricklen, N., 3053
Strong, J., 3082
Suarez, J., 3167
Sullivan, J., 3194
Suresh, A., 3082
Sutton, A., 3031
Tanghal, K., 3083
Taylor, R., 3013
Taylor, R., 3053
Tee, M., 3082
Teong, V., 3195
Terry, A., 3000
Thomas, A., 3012
Thomas, E., 3053
Thompson, M., 3005
Tirado, P., 3176
Tlatenchi, F., 3013
Tolbert, D., 3031
Torres, E., 2988
Tracy, K., 3195
Tran, H.D., 3194
Tran, L., 3118
Trejo, B., 3053
Trinidad, V., 3053
Trott, A.J., 3024
Truong, J., 3100
Tucker, G., 3018
Turenshine, D., 3186
Vaca, L., 3176

- Valdez, C., 3026
Valdivia, J., 3053
Valenzuela, M., 3094
Valera, A., 3132
Valesquez, K., 3210
Vasquez, E., 3053
Velasquez, L., 3053
Velasquez, M., 3195
Velazquez, A., 3053
Velazquez, J., 3053
Velez, M., 3167
Venkitaramanan, H., 2980
Vera, D., 3194
Villa, V., 2992, 3002
Villalobos, D., 3082
Villasenor, M., 3195
Villegas, M., 3069
Vinueza, J., 3053
Voorhees, G., 3163
Walker, S., 3042
Wang, A., 3099
Wang, V., 3128
Warner, J., 3211
Watts, D., 3005
Weber, C., 3022
Weiss, C., 3136
Wengrod, J., 3070
Whatley, J., 3014
Williams, C., 3031
Williams, L., 3176
Wilson, Q., 2989
Wong, B., 2988
Wu, E., 3025
Wu, S., 3130
Xolalpa, A., 2992, 3002
Yadidi, E., 3098
Yadidi, S., 3053
Yang, I., 3145
Yeh, M., 3111
Yoo, J., 3037
Yoo, N.H., 3149
Yoon, M., 3141
Young, B., 3193
Yu, M.B., 2993
Yun, A., 3036
Yun, J., 2998

TEACHER AND MENTOR INDEX

Grade Schools

J. LUI

24th Street School
2055 West 24th Street
Los Angeles, CA 90018

W. MONTGOMERY

24th Street School
2055 West 24th Street
Los Angeles, CA 90018

Middle School

U.A. HERNANDEZ

Mulholland Middle School
17120 Vanowen Street
Van Nuys, CA 91406

T. MILLER

Parkman Middle School
20800 Burbank Boulevard
Woodland Hills, CA 91364

J.O. FOGELMAN

Olive Vista Middle School
14600 Tyler Street
Sylmar, CA 91342

I. ODUNZE

Bethune Middle School
155 W. 69th Street
Los Angeles, CA 90003

E. KNUDTEN

Olive Vista Middle School
14600 Tyler Street
Sylmar, CA 91342

M. OLIVER

Olive Vista Middle School
14600 Tyler Street
Sylmar, CA 91342

W. MAYEA

Olive Vista Middle School
14600 Tyler Street
Sylmar, CA 91342

N. PAL

Robert Fulton Middle School
7477 Kester Avenue
Van Nuys, CA 91405

T. MILLER

Holmes International Middle School
9351 Paso Robles Avenue
Northridge, CA 91325

T. RUNDALL

Olive Vista Middle School
14600 Tyler Street
Sylmar, CA 91342

D. SHAH

Gaspar de Portola Middle School
18720 Linnet Street
Tarzana, CA 91356

M. SIMONDS

Portola Highly Gifted Magnet Middle School
18720 Linnet Street
Tarzana, CA 91356

M.J. TULLY

Mulholland Middle School
17120 Vanowen Street
Van Nuys, CA 91406

G.C. ZEM

Ernest Lawrence Middle School
10100 Variel Avenue
Chatsworth, CA 91311

High School

A. ALTSHILLER

Van Nuys High School
6535 Cedros Avenue
Van Nuys, CA 91411

R. BAKER

University High School
11800 Texas Avenue
Los Angeles, CA 90025

P. BARKER

Hollywood High School
1521 N. Highland Avenue
Los Angeles, CA 90028

R. BUCK

Louisville High School
22300 Mulholland Drive
Woodland Hills, CA 91364

S. COOPERMAN

Milken Community High School
15800 Zeldins' Way
Los Angeles, CA 90049

R. COUTTS

Van Nuys High School
6535 Cedros Avenue
Van Nuys, CA 91411

M. DIAZ

Ramona Convent Secondary School
1701 West Ramona Road
Alhambra, CA 91803

D. EVANS-BYE

Clark Magnet High School
4747 New York Avenue
La Crescenta, CA 91214

A. FLAGAN

Ramona Convent Secondary School
1701 West Ramona Road
Alhambra, CA 91803

K. FONTILEA

Grant High School
13000 Oxnard Street
Valley Glen, CA 91401

D. GAUGHEN

Taft High School
5461 Winnetka Avenue
Woodland Hills, CA 91364

R. GILBERT, PH.D.

Valley Alternative High School
14162 East Lomitas Avenue
La Puente, CA 91746

C.F. HAJDU

Joaquin Miller High School
8218 Vanalden Avenue
Reseda, CA 91335

D. HINDEN

Harvard-Westlake School
3700 Coldwater Canyon
North Hollywood, CA 91604

A. KAKASSY

Granada Hills High School
10535 Zelzah Avenue
Granada Hills, CA 91344

S. LIN

Ramona Convent Secondary School
1701 West Ramona Road
Alhambra, CA 91803

D.M. McDONNELL

Sherman Oaks Center for Enriched Studies
18605 Erwin Street
Reseda, CA 91335

K. MUKAI

Sherman Oaks Center for Enriched Studies
18605 Erwin Street
Reseda, CA 91335

Y. OHANESYAN

A.G.B.U. Demirdjian High School
6844 Oakdale Avenue
Canoga Park, CA 91306

D. PAPADAKIS

South Pasadena High School
1401 Fremont Avenue
South Pasadena, CA 91030

C. RILEY

El Camino Real High School
5440 Valley Circle Boulevard
Woodland Hills, CA 91367

C. SAMS

University High School
11800 Texas Avenue
Los Angeles, CA 90025

O. WIEDOEFT

San Fernando High
11133 O'Melveny Avenue
San Fernando, CA 91340

O. WEIDOEFT

Chatsworth High School
10027 Lurline Avenue
Chatworth, CA 91311

B. WILKEN

Van Nuys High School
6535 Cedros Avenue
Van Nuys, CA 91411

D. WILLIAMS

North Hollywood High School
5231 Colfax Avenue
North Hollywood, CA 91601

M. CORCORAN, PH.D.

C. Coyle-Thompson, Ph.D.
R. Seki, Ph.D.
M. Wittig, Ph.D.
California State University, Northridge
18111 Nordhoff Street
Northridge, CA 9133

SUBJECT INDEX

Number refers to abstract number

ASTRONOMY

3184 3189 3191

CELLULAR AND MOLECULAR BIOLOGY

2985 3054 3169
2996 3065 3176
3010 3070 3178
3025 3072 3192
3039 3108 3197

CHEMISTRY

2979 3052 3135
2981 3067 3138
2987 3080 3149
2989 3098 3171
3000 3099 3181
3008 3105 3183
3019 3114 3185
3024 3117 3199
3040 3122 3207
3044 3123 3208
3047 3125
3049 3128

COMPARISON

2982 3051 3131 3175
2997 3059 3136 3186
2998 3073 3141 3187
2999 3074 3145 3201
3003 3076 3155
3004 3079 3157
3018 3091 3160
3021 3113 3161
3028 3119 3162
3036 3126 3165
3037 3129 3167

COMPUTER SCIENCE

3095

ECOLOGY AND ENVIRONMENTAL BIOLOGY

2980 3031 3053
2990 3042 3159
2992 3045 3190

INVERTEBRATE BIOLOGY

2983 3034 3127
2988 3035 3151
3001 3082 3152
3016 3083 3173
3017 3109 3194
3030 3120

MICROBIOLOGY

2986 3078 3177
3007 3084 3195
3014 3104 3203
3023 3116 3209
3038 3118
3041 3164

MISCELLANEOUS

3022 3102
3068 3156

PHYSICS

3005 3071 3111
3015 3086 3115
3056 3088 3121
3062 3101 3133
3063 3106 3140

3166 3180 3182
 3172

PLANT PHYSIOLOGY – CHEMISTRY

2984 3058 3144
 2991 3075 3147
 2993 3085 3150
 2994 3089 3154
 3013 3090 3163
 3032 3092 3193
 3033 3096 3200
 3046 3112 3204
 3048 3132 3211
 3050 3137
 3057 3142

PLANT PHYSIOLOGY – ENVIRONMENTAL

2995 3093 3146
 3002 3097 3148
 3009 3103 3153
 3020 3107 3168
 3027 3110 3179
 3055 3124 3205
 3061 3130 3210
 3064 3134
 3077 3139

PSYCHOLOGY

3006 3043 3143
 3012 3060 3170
 3026 3066 3188

VERTEBRATE BIOLOGY

3011 3087 3196
 3029 3094 3198
 3069 3100 3202
 3079 3158 3206
 3081 3174

ABSTRACTS

2979

WHICH FRESH-SQUEEZED FRUIT JUICE HAS THE MOST VITAMIN C?

Christine Fu and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of which fresh-squeezed fruit juice has the most Vitamin C. It was tested with 5 types of fruit juices. Each juice was tested three times with indophenol solution, a blue liquid that becomes colorless when enough Vitamin C is added to it. The constant was the 10 ml of indophenol solution in each test tube. Adding 20 droplets of water to 10 ml of indophenol solution to stay blue serves as color control. The experimental variable was the number of drops of juice that made the indicator colorless. The grapefruit juice took 29 drops to change the indicator, the kiwi 31, the navel orange 42, the lemon 55, and the Sunkist orange 57 respectively. The grapefruit juice took the least amount of droplets to change the indicator. This observation suggests that the grapefruit juice has the most amount of Vitamin C compared with four other fruit juices.

2980

ANALYSIS OF HEAVY METALS IN AND AROUND THE LOS ANGELES HARBOR

Areni Mahdessian, Jasmine Bonilla, Vista Ezzati, Cristina Frankian, Christine Gharibian, Katherine Gharibian, Jeffery Ho, Christopher Kilpatrick, Maral Mirzayan, Leonardo Ortega, Punardeep Sikka, Harish Venkitaramanan, Shannon Bain, Asmik Gasparyan, and Dominique Evans-Bye (teacher). Clark Magnet High School, 4747 New York Ave., La Crescenta, CA 91214.

The Environmental and Spatial Technology class at Clark Magnet High School has pursued testing sediment and marine life tissue samples in and around the Los Angeles Harbor for contamination of CAM-17 metals. These CAM-17 metals pose a threat to the environment, marine life, and humans if consumed in large amounts.

Through Occidental College, Clark Magnet High School's E.A.S.T. class was able to charter the Research Vessel Vantuna for three boat trips taken in October and November. While onboard the research vessel, students followed Environmental Protection Agency's collection guidelines as closely as possible, using appropriate equipment, collection procedures, and labeling techniques. Using an Otter Trawl and Vanveen Grab, the students collected sediment samples and marine life from locations previously discussed to be possible areas of high contamination. Samples were taken along the area where the Los Angeles River empties into the harbor and near an abandoned shipyard.

While on the boat trips, students used GPS handheld systems to record exact locations of sampling areas of the sediment and marine life. These locations were then transferred onto GeoMedia and Arcview. These programs helped create a map of our sampling locations, boat trails, and the Kongsberg Sonar location which was provided by the Ventura County and San

Bernardino County Sheriff's Departments. Using Arcview Spatial Analysis, students were able to create maps showing concentration gradients of the different chemicals.

After every trip, the students dropped off their samples at EMAX Laboratories in Torrance, California which had donated their services for the class' project. The samples followed the Chain of Custody protocols to ensure that they were accounted for twenty four hours a day. The lab tested the following metals using an ICP method: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc; the mercury was tested by the process of Cold Vapor.

Introduction: After reading articles regarding Montrose Chemical Company's dumping of DDT and PCBs off the waters of the Palos Verdes Shelf, students became eager to learn more about the effects these chemicals had on the marine life and what other possible pollutants could be contaminating the waters. The students had planned on testing for DDT but unfortunately EMAX was currently doing testing for the EPA, so they were not able to perform the same tests for the class. The students hypothesized that if CAM-17 metals were being deposited in the ocean, then they must transfer up the food chain to the marine life and then to birds and humans which consume seafood.

"Heavy metals are stable and persistent environmental contaminants since they cannot be degraded or destroyed. Therefore, they tend to bioaccumulate in the soils and sediments" ("Heavy"). Bioaccumulation is a process where chemical pollutants enter into the body of an organism and collect in the organism's tissues instead of being excreted (Van de Broek 2002). These metals are essential to life and are not harmful when consumed in small amounts but they can have serious side effects if consumed in large doses.

"Anthropogenic impacts including, industrial discharges, domestic sewage, non-point source runoff and atmospheric precipitation are the main sources of toxic heavy metals that enter aquatic systems" (Van de Broek 2002). It is said that the sediment is "well known to act as the most important reservoir" of metals and other pollutants (Van de Broek 2002).

The Port of Los Angeles is one of the largest cargo ports in the United States. The Port of Los Angeles has very limited recreational usage. Recreational fishing within the harbor is discouraged because of heavy metals contamination of certain species of fish ("Welcome"). Ballona Creek drains a watershed of about 127 square miles, which includes the sparsely populated Santa Monica Mountains to the north, as well as the densely populated cities of Hollywood, Culver City, Inglewood, and parts of Los Angeles and Santa Monica. Because the creek drains such highly urbanized areas, its discharge to Santa Monica Bay carries large amounts of sediment and pollutants, such as oils and grease, bacteria, and heavy metals ("Watershed").

Metals such as cadmium, lead, mercury, and arsenic which are nonessential to the body are toxic even in very small doses while zinc and copper, which are essential to the body, can be hazardous at high levels. ("Hazardous"). Exposure to heavy metals has been linked with developmental retardation, various cancers, kidney damage, and even death in some instances of exposure to very high concentrations. Exposure to high levels of mercury, gold, and lead has also been associated with the development of autoimmunity, in which the immune system starts to attack its own cells, mistaking them for foreign invaders (Van de Brook 2002).

Heavy metals are not only dangerous to the marine life but to humans as well. If this problem goes unidentified, many innocent people may become sick and could possibly face serious side effects. Heavy metals and ocean pollution are a threat to the innocent marine life which populate our oceans. Their bodies may have adapted to live in these conditions but that doesn't mean that they are safe from the threat of disease, infection and death. This issue needs to be explored more to determine whether or not any marine life caught in the Los Angeles Harbor and Palos Verdes Peninsula area is suitable for consumption by humans.

Methods and Materials: From Occidental College, the Research Vessel Vantuna was chartered for three boat trips. On October 24, 2002 the students ventured on their first boat trip to the Palos Verdes Peninsula area. At their first sampling location, a Vanveen Grab was deployed into the ocean bottom to collect sediment. Once the Vanveen Grab was brought onboard, it was released into a large metal sorting table where the students, using latex gloves, sorted through the marine life and sediment. The sediment and infauna were then placed into tinted four-ounce jars which had nonmetal lids. Every jar was then labeled using a previously decided method.

The method of labeling was using the number of the boat trip, and then the letter of the sample according to time taken. Therefore, all the samples on the first boat trip would begin with the number 1 and then given a letter in alphabetical order, the second trip samples being labeled with a number 2 and a letter, and the only sample collected on the third and final boat trip being 3A.

While some students were sorting through the contents of the Vanveen Grab, others were using GPS handheld systems to track their path and sampling location via satellites. Other students were manually recording the data on spreadsheets which contained information about the sampling location, consistency of the sediment and its characteristics.

After all sediment and infauna were collected, they were stored in an ice-packed cooler and sealed with duct tape. Then the class used an Otter Trawl to collect marine life such as shrimp, lobster, different assortments of fish, and other marine life. These samples were stored in plastic containers and placed on ice for transport. Then they were frozen for later analysis.

After the collecting process was finished at the end of each day, the samples were immediately transferred to EMAX Laboratory for testing. Five sediment samples were tested by EMAX and the drop off included a filing of Chain of Custody papers which stated at what time the samples were dropped off, where they were being stored, and at what time they were tested and analyzed.

This same procedure was followed again on November 14, 2002 which included another drop off of five sediment samples. On our third and final boat trip on November 21, 2002, the class arranged the usage of a Kongsberg Sonar to receive images of their final sampling location. Only one sediment sample was taken on the final boat trip using the methods previously described and was taken to EMAX.

While waiting for the results from EMAX Laboratory, students began working on the mapping of the Vanveen Grab locations, boat's paths, and the Otter Trawl locations. The locations were uploaded onto GeoMedia and Arcview. Using the longitude and latitude coordinates the GPS systems were able to record points of our sampling locations which were plotted onto a map

of the Los Angeles Harbor and Palos Verdes Peninsula area. Each sampling day was given a different color coding and the sampling locations were labeled according to the labels on the jars. After the sediment samples were plotted, the students were able to upload the different paths of the boat onto the software and color code the paths according to the day the trip was taken. The Kongsberg Sonar location was also plotted using a bright red dot on the map. Using Arcview Spatial Analysis, students created a map which showed the concentration gradient of each of the chemicals.

Once the class received the analysis of their eleven samples, the information was entered into their map. Using GeoMedia, students were able to transfer the amounts of CAM-17 metals into a spreadsheet which would pop up when the specific point was clicked upon.

After all work on the maps was finished, students rechecked their work to make sure no errors were made while transferring data.

Results: A wide range of concentration levels were received for most of the sampling locations. However, antimony, beryllium, molybdenum, selenium, silver, and thallium were not detected in the eleven samples taken at the different locations while the 1E sample was shown to have a concentration level of 10.4 mg/kg of arsenic. Cadmium was detected at 1.04 mg/kg at our 1A sampling location and was not detected at any of the other ten samples.

Samples 1A through 1E were taken in and around the Palos Verdes Peninsula area near White's Point where the highest level of barium contamination was shown to be at 262 mg/kg. The levels of concentration for barium in samples 1A–1E ranges from 108 mg/kg to 262 mg/kg while samples 2A–3A ranges between 53.5 mg/kg to 85.6 mg/kg.

Chromium was apparent in all of the samples. The most concentrated sample found was at our 1E location where it contained 38.2 mg/kg of chromium. Copper was detected in all samples and its range was 8.3 mg/kg to 129 mg/kg. Concentration levels of cobalt ranged from 0 mg/kg to 5.74 mg/kg in the samples 1A–1E. However, levels in the samples 2A–3A ranged between 3.14 mg/kg to 6.34 mg/kg. Lead went undetected in five of our eleven samples but samples 1D through 2C and 2E ranged from 11.9 mg/kg to 47.7 mg/kg with the higher levels of concentration at the mouth of the Los Angeles River. Mercury was found at five of our sampling locations all near the Palos Verdes Peninsula. The amounts ranged from 0.35 mg/kg to 0.222 mg/kg. Nickel was found at all of our sampling areas and the levels ranged from 4.93 mg/kg to 18.5 mg/kg with the highest level being at our 1D sampling location. Vanadium was found at all sampling locations and its concentration levels ranged from 19.2 mg/kg to 43.5 mg/kg. Zinc was detected at all our locations and its levels were 25.9 mg/kg to 104 mg/kg.

2981

SALT, WATER, AND HEAT: WHAT HAPPENS WHEN THEY MEET?

M. Sarebanha and G. C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

What causes water to evaporate? Thinking that a fluid can just disappear is a very fascinating fact. My project deals with the relationship between salt, water, and heat. I would place a certain amount of water on a hot plate, add salt, and then time how long it would take for it to evaporate. I found that when I used the same amount of salt, and the same amount of water the evaporation time mainly ranged around six minutes. Yet once I used different amounts of salt than water, the evaporation times varied. The less salt I used, the longer it would take for a reaction. Keep in mind that the most amount of water I used was only one cup. The more salt and the more heat I used, the quicker the evaporation occurred. Once all the water was gone, all that was left was salt. When the salt was exposed to heat, after the water would evaporate, the salt would bubble. This project was extremely fun and not only did it show me about evaporation within my own kitchen, but it gave me a better understanding of evaporation within the ocean.

2982

EFFECTS OF DOWNY FABRIC SOFTENER ON WASHCLOTHS

Ella Lowensohn and M. Simonds (teacher). Portola Highly Gifted Magnet Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of possible Downy Fabric Softener involvement in the absorbency of washcloths. Washcloths were washed with or without Downy Fabric Softener and then tested for absorbency. Each experiment was repeated 10 times. The washcloths washed in Downy were significantly less absorbent than those washed without Downy. The results suggest that Downy Fabric Softener reduces absorbency in fabrics and should therefore not be used on towels.

2983

WHAT IS THE EFFECT OF SALINITY ON THE FERTILIZATION OF *LYTECHINUS PICTUS*?

Joseph Aames, Jeffer Chua, Katrina Desamito, Farrah Palma, Brittney Renken, and Patricia Barker (teacher). Hollywood High School, 1521 N. Highland Ave., Los Angeles, CA 90028.

In this experiment we wanted to figure out which salinity is best to fertilize Sea Urchin eggs. To do this we did some background research via the Internet. Data from the ocean suggests that the average salinity is 33ppt (parts per thousand)= 3.3% salinity. We then tried to mimic what

makes up ocean water by making Artificial Sea Water: NaCl, KCl, CaCl₂, MgCl₂, MgSO₄, and NaHCO₃. Using the formula $M_1V_1=M_2V_2$, we diluted seawater to have the following concentrations: 99ppt, 66ppt, 33ppt (control), 17ppt, 8.6ppt, and 0ppt (fresh water). After preparing the sea water, we then experimented with the eggs. The class was divided into groups that were assigned a concentration of seawater in which to conduct the fertilization of the Sea Urchin eggs. Results showed 99ppt, 0.33%; 66ppt, 14%; 33ppt (control), 0.63%; 17ppt, 14%; 8.6ppt, 2.5%, and 0ppt, 7.3%. We had expected that 33ppt would yield the most fertilization since it was the average salinity of seawater, but our results showed that 66ppt and 17ppt both yielded the best fertilization. Some sources of error occurred like miscalculation, temperature to maintain the eggs and sperm, counting, allotted time and contamination and may have all affected our results. The next time we conduct this experiment, we need to pay better attention to these and other variables. Also, the time the microscope lamp was on may have dried up the eggs. We will need to properly mimic the sea urchin living environment, with temperature, and use fewer eggs so they won't dry up while being counted.

2984

EFFECTS OF ASPIRIN ON GROWTH OF IMPATIEN PINK FLOWERS

Adrian Chapman and D. Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the effects of large doses of aspirin on the height, rate of growth, and length of lifetime on the Impatien Pink flower. One of two groups of 20 of these plants was given 750 mg each of aspirin dissolved in 60 ml of water each day. Such large doses of aspirin were used in the experiment so that its effects could be clearly observed. The group that was given the aspirin showed an average 51-percent decrease in height and their life spans were cut by 25 percent in comparison to those that were not given aspirin. They also showed a 62 percent decrease in growth rate. Those plants given aspirin also showed signs of massive dehydration, such as withering, limpness, and browning, as well as cellular decomposition, but they did not actually die until 12 days after the experiment began. Whereas those not given aspirin showed excellent upright posture and stiff stems, and they kept their bright green color until the final stages of the experiment. In conclusion, from the data derived from this experiment, aspirin can cause even healthy Impatien Pink flowers to show massive signs of dehydration and cellular decomposition.

2985

RT-PCR OF MESSENGER RNA IN ZEBRA FISH**DEVELOPING STAGES EMBRYO**

Arezo Sarwary, Michelle Diep, and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Blvd., Woodland Hills, CA 91367.

The purpose is to utilize PCR to amplify messenger RNA copies in zebra fish. The chemistry of PCR depends on the complementarities of the DNA bases. When one molecule of DNA is sufficiently heated, the hydrogen bonds holding together the double helix are disrupted and the molecule denatures into single strands instead of a double strand. Complementary base pairs can renature and the double helix can be restored if the DNA solution is allowed to cool. In performing a PCR reaction, a small amount of the target DNA is added to a test tube that contains a buffered solution of DNA polymerase, oligonucleotide primers, four deoxynucleotide building blocks of DNA, and the cofactor, magnesium chloride. The PCR mixture is then taken through replication cycles in a Gene Cyclor Thermal Cyclor.

The embryos are collected and frozen for extraction. At least 100 embryos are used for investigation. The embryo's total RNAs are prepared from a pool of mixed embryos. Messenger RNAs are extracted by the method of Chromczynski and Sacchi (1987) and modified for fish tissues (Gong et al, 1992). Complementary DNA synthesis is carried out using an oligo dT primer. The PCR products are analyzed by agarose gel electrophoresis using 100-bp DNA ladder as molecular weight markers.

RT-PCR can make billion of copies of complementary DNA from stage embryo's messenger RNA. To perform the polymerase chain reaction, a series of steps are used. Our research team selected the QIAGEN RT-PCR to transcribe messenger RNA to complementary DNA. This process is known as reverse transcriptase and is an important factor in the PCR process. In addition, a PCR Kit donated by AMGEN Biotechnology Corporation is also used for the PCR procedure. The Kit's components consist of three of AMGEN's PCR products: Master Mix I, Easter Mix II, and Taq polymerase. These enzymes and reagents along with the isolated messenger RNA are the key components in the PCR process. In PCR, the single-stranded complementary DNA to be copied and short pieces of synthetically made DNA known as primers are added together. The primers bind to place on the cDNA and copying begins. DNA polymerase and free nucleotides are added to the mixture. The DNA polymerase adds complementary free nucleotides to the primer. The result is a double strand of DNA that are complementary to each other and to the originating strand. This heating and replication process is repeated over and over again, resulting in many copies of the DNA sample in a short amount of time. A Bio Rad Gene Cyclor Thermal Cyclor Version 1.5, 100/120V is used in the PCR process. This cyclor is manually programmed with the necessary steps and cycles that the PCR has to run through in order to obtain results. The PCR is carried out for 30 cycles of 94 degrees Celsius where the DNA is denatured into single strands. One minute at 58 degrees Celsius where the primers hybridize to their complementary sequences on either side of the target sequence. One minute at 72 degrees Celsius where the polymerase binds and extends a complementary DNA strand from each

primer. The primer (antisense and sense strands) annealing temperature is 58 degrees Celsius for IL-6 Family of Cytokines complementary DNA. This Gene Cyclor Thermal Cyclor is very important for it makes about a billion copies of one-strand of complementary DNA.

PCR is very important because it allows an easier technique in acquiring many copies from one double-stranded DNA. It has helped many scientists in experimental designs. It also has been a major contribution to the scientific field of study. It has been proven to be a quick, reliable method for usage in many different areas of science including detection of mutations that associate with genetic disease. PCR has allowed scientists to make billions of copies of DNA without using cloning. It has proved beneficial in our NSF/Eisenhower research that has been conducted in the classroom. I've learned so much. I'm grateful to have gained this brilliant experience.

2986

THE BINDING ACTIVITY OF CONCAVALIN A DECREASES WITH INCREASING TEMPERATURE

Rachel Birke, Andrew De La Cruz, Catherine Gramajo, Jackie Lopez, and Urenia Astrid Hernandez (teacher). Mulholland Middle School, 17120 Vanowen St., Van Nuys, CA 91406.

The purpose of this experiment was to determine if temperature would have an effect on the binding capacity of Concanavalin A (Con A) to yeast cells. Concanavalin A is a large protein that has the ability to bind to the sugars present on the surface of the yeast cell's membrane. The experiments were carried out in distilled water and Con A was placed on ice for at least five minutes prior to performing the experiment. The experimental protocol involved placing two drops of distilled water on one side of the slide and two drops of distilled water on the other side and later adding Con A and yeast cells. The control group was carried out at 25 degrees Celsius and the experimental group at 8-12 degrees Celsius. It was found in all trials performed that binding of Concanavalin A to yeast cells was greater in the control group than in the experimental group. The experimental set up contained Con A beads with many empty sites as compared to the control group in which most sites were occupied by yeast cells. The results indicate that temperature has an effect on the binding capacity of Con A to yeast cells.

2987

WHICH FRESH FRUIT HAD THE HIGHEST PH?

Daniel Park and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This project answered the question of which fresh fruit would have the highest pH level. Fresh fruits were cut, squeezed, and tested for their pH level. Each experiment was recorded 4 times. Pineapples came out to have a pH level of 4 in all experiments. Grapefruits came out to have a pH level of 3 in all 4 experiments. Lemons came out to have a pH level of 2 in all

4 experiments. Kiwis came out to have a pH level in a range of 4 to 6. Mangoes came out to have a pH level in a range of 5 to 6. Oranges came out to have a pH level in a range of 5 to 6. This experiment shows that of the tested fruits, oranges and mangoes have the highest pH levels.

2988

TWO-WAY DIETARY PREFERENCE OF *RHYPAROBIA MADERA*

Brittany Alba, Alyssa Arias, Tiffany Cruz, Adriana Goni, Monica Hernandez, Jerhika Martin, Lisette Molina, Jenice Pua, Erika Ramirez, Eve Torres, Brittany Wong, and Sandor Lin (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

Previous studies have shown that cockroaches have the ability to self select a diet best for growth and development, consisting of a protein:carbohydrate ratio of 20:80 percent. The purpose of this experiment is to observe whether this ratio still holds true when lipids are introduced as a choice. The diets consisted of lyophilized cubes of protein (casein), carbohydrate (sucrose), or lipid (canola oil). *Rhyparobia madera* nymphs were normalized to the diets for one week prior to the start of the experiment. The cockroaches were given two dietary options and each placed into individual feeding arenas. The diets were oven dried and weighed prior to the experiment. The roaches were kept in a 26°C incubator with a 12:12 light:dark cycle for one week. The remaining amount of diets were then re-dried and re-weighed. The results showed the *R. madera* nymphs consumed a protein:carbohydrate:lipid ratio of 17:76:7. The ratio of protein diet consumed remains statistically unchanged. This indicates when given a wider range of dietary options, the cockroaches still choose the optimal amount of protein.

2989

DOES SOIL OR WATER HOLD HEAT LONGER?

Quaddriyah Wilson and Daniella Williams (teacher). North Hollywood High School, 5231 Colfax Avenue, North Hollywood, CA 91601.

This experiment was designed to determine whether soil or water held heat longer. I believe that soil will hold heat longer. In the experiment, I placed a thermometer into two cups, one filled with water the other with soil. The initial temperature of the soil was 58°F and the initial temperature of the water was 71°F. I then placed a desk lamp over the cups. I checked and recorded the temperatures of the soil and the water every three minutes for fifteen minutes. After fifteen minutes, I found that the temperature of the soil rose by two degrees and the water only rose by one degree. I turned the lamp off and continued recording the temperatures of both the soil and the water every three minutes for fifteen minutes. After fifteen minutes, the soil temperature had dropped by two degrees and the water by about two to three degrees. I found that the water tended to cool faster than the soil because of the amount of heat that was absorbed. I also found that the water radiated more heat into the air. In conclusion, I found my hypothesis about soil containing more heat to be right on point.

2990

THE EFFECTS OF EROSION ON DIFFERENT TYPES OF SOILS

Sawyer Gordon and G. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This study examined which soil erosion would affect the most. There were three different types of test soils: sand, dirt, and mud. Each soil was "rained" on for four days with either one cup or two cups of water. The water would drain out of the box where the soils were held and then I was able to measure the amount of soil that eroded in the "holding box." As predicted, sand eroded the most, followed by the dirt and then mud.

2991

THE EFFECTS OF OTC (OVER-THE-COUNTER) DRUGS ON LIMA BEAN PLANT GROWTH

Ashley Coburn and M. Simonds (teacher). Portola Middle School Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of which OTC (over-the-counter) drug made the lima bean plant, *Phaseolus limensis*, grow tallest within a two-week growth period. Seeds were planted into eight pots with two beans in each with different drugs: acetaminophen, ibuprofen, and naproxen sodium. Each pot was watered every day continuously. The pots with acetaminophen grew the tallest with the average of 366mm whereas the pots with no drug grew to about 254.5mm. The pots with ibuprofen and naproxen sodium did not grow. These results suggest that acetaminophen is what makes the lima bean plant grow taller.

2992

THE EFFECTS OF SEASONAL CHANGES ON THE GEOLOGY AND ECOLOGY OF THE MALIBU WATERSHED

O. Archila, M. Alberto, F. Avitia, G. Celis, O. Diaz, J. Espinoza, F. Jimenez, J. Juarez, J. Jurado, Y. Llamas, L. Macias, K. Martinez, J. Moreno, S. Mosqueda, I. Muhannad, D. Ortiz, D. Perez, J. Rivera, D. Rodriguez, L. Salinas, J. Singh, V. Villa, A. Xolalpa, C. Munoz, R. Sanchez, V. Ramirez, A. Rodriguez, R. Mariscal, H. Nguyen, and M.U. Tully (teacher). Mulholland Middle School, 17120 Vanowen St., Van Nuys, CA 91406.

The objective of this project is to involve sixth grade middle school students in a standards-based immersion project, that links both literacy and hand-on activities in the classroom setting. The students learn standards-based units such as the fresh flow of water, erosion and deposition, and ecology through lecture, and also integrate hands-on activities based on the application of their knowledge to real world events occurring within the Malibu Watershed.

This project continues and broadens the work that my middle school students have done on water quality studies on the Malibu watershed and analyzes the effects of seasonal changes on the integrity of the habitats within the Malibu Watershed. Our present study investigates the geology and ecology of three specific areas which comprise the Malibu watershed: The Malibu Creek which drains into the Malibu Lagoon (a natural estuary), and the Malibu Beach area. Previously, for the last two years, my students and I performed chemical analyses on the water from these three areas in order to detect seasonal changes and levels of pollution and toxicity of this watershed system over time, which threaten the development of plant, vertebrate and invertebrate species living in the Malibu Creek, Malibu Lagoon and the Malibu Beach areas.

In this study, we found that the severe weather conditions such as wind, rain storms and flooding, during the fall and winter months, have severe consequences and impact each of the habitats in the Malibu Watershed differently. We also found that since each of these areas are geologically and ecologically connected together, the events which take place at the lowest part of the watershed, the Malibu Lagoon and Malibu Beach, are heavily dependent on what occurs at the higher elevations of the watershed, such as Malibu Creek State Park. This study heightened the students' awareness and understanding that the flow of freshwater downhill sculpts the land through erosion and deposition of sediment in the beach area (geology) and affects the distribution of plant and animal species of each of the habitats within the Malibu Watershed (ecology).

2993

EFFECTS OF TABLE SUGAR ON AFRICAN VIOLET LEAF CUTTING ROOT GROWTH

Mary Beth Yu and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study was designed to test the hypothesis, "African violet leaf cuttings that are placed in sugar water grow roots faster." 20 leaves were removed from African violet plants and placed in water with no sugar, 3 mL of sugar, 6 mL of sugar, and 9 mL of sugar for 6 weeks. The plants with no sugar, the control group, had an average of 8.9 cm of root growth, with 80% of the cuttings growing roots. Those with 3 mL of sugar had an average of 7.2 cm of root growth, and 60% grew roots. Those with 6 mL of sugar had an average of 4.6 cm of root growth, and 40% grew roots. Those with 9 mL of sugar had no root growth. The results suggest that table sugar retards root growth in African violets and reduces the chances of roots growing at all.

2994

DEADLY DAISIES

A. Griffin, S. Pittman, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

The purpose of this experiment was to determine if vinegar would kill a yellow daisy. In this experiment, we used five similar yellow daisies and cut each of their stems to 2 inches. We added 12 mL to each test tube before adding the daisies. There were 5 test tubes. Test tube 1 contained 12 mL of vinegar, test tube 2 contained 12 mL of water, test tube 3 had 6 mL of water and 6 mL of vinegar, test tube 4 contained 9 mL of vinegar and 3 mL of water and test tube 5 contained 3 mL of vinegar and 9 mL of water. We observed the daisies for a day and a half. We were able to determine which daisies were dying by observing the percentage of petals that were wilting versus the petals that were not wilting. The vinegar appeared to preserve instead of kill the daisy. Water did not cause a change in the daisy. The half water-half vinegar mixture caused the highest percentage of wilted petals in the daisy. The solution in test tube 4 caused the second highest percentage of petals to wilt. The solution in test tube 3 caused the third highest percentage of wilted petals. Our hypothesis was proven wrong because the vinegar solution helped the daisy survive instead of causing the daisy to die.

2995

THE EFFECTS OF PHOTOPERIOD INTERRUPTIONS ON A LONG AND SHORT NIGHT PLANT

Nicole De Nisco and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

This research project dealt with the effects of photoperiods and light on the flowering of plants. It was a two-part experiment. In the first part, the photoperiods of the flowers primrose and petunia were determined by exposing the long night plants (primrose) and the short night plants (petunia) to varying night lengths of either 12 or 14 hour periods. The second part of the experiment tested the effect of exposing the plants to different colors of light in the middle of their dark period on the flowering of the plants. I interrupted the dark period of my experimental group with exposure of different colors of light: yellow, red, blue, white, and black. The interruption of the dark period prevented the primrose plants from flowering. Exposure to a short night period longer than the critical length allowed the petunias to develop two buds. New buds also formed under blue and white lights.

2996

DIFFERENCES BETWEEN NORMAL AND CANCER CELLS

Stacey Shuai and M. Simonds (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This investigation approached the question of differences between the normal cell and cancerous cell's appearance, morphology, and growth under different conditions. Both types of cells were incubated under 37°C and 10% carbon dioxide under 1% and 10% serum. Over the next five days, the cells were counted using a Hemacytometer and appearances were compared after shooting pictures using a digital camera. The number of cells per milliliter was recorded. The experiment was repeated three times. The cancer-free cells grew at an average of 0.46×10^5 /ml per day under 1% serum and 1.2×10^5 /ml under 10% serum. The cancer cells grew at an average rate of 1.03×10^5 /ml under 1% serum and 3.41×10^5 /ml under 10% serum. The rounded, shiny cancer cells continued to stack upon each other after growing space ran out while the flattened, clear normal cells stopped growth up to a certain point. The results show that cell growth under 1% serum to 10% serum is greater and less controlled in a cancer cell than in cancer-free cells.

2997

LONGEVITY OF RECHARGEABLE BATTERIES AFTER REPEATED USAGE

John Chen and M. Simonds (teacher). Portola Magnet School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined the question of whether rechargeable batteries lasted as long after being recharged. Batteries were tested on the same flashlight. Rechargeable batteries included these 4 brands: Sanyo Regular, Sanyo Rechargacell, Sony, and Rayovac. Each experiment was timed and repeated 4 times. Sanyo Regular's time decreased by 13 min., 53 sec. over 4 charges. Sanyo Rechargacell's time decreased by 3 min., 22 sec. over 4 charges. Sony's time decreased by 11 min., 20 sec. over 4 charges. Rayovac's time decreased by 10 min., 31 sec. over 4 charges. The results suggest that batteries have shorter longevity every time they are fully recharged.

2998

STRENGTH OF PAPER TOWELS

Jessica Yun and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study tested the strength of 5 different brands of paper towels: Bounty, Viva, Scott, Brawny, and Mighty. In this experiment, 1 cup, or 236.588 mL, of water was poured on each

paper towel from the 5 different brands. Then quarters were placed on the paper towels as weights. This process was repeated 5 times for each paper towel. Bounty held an average of 120.8 quarters, Viva held an average of 141.6 quarters, Scott held an average of 99.6 quarters, Brawny held an average of 82.8 quarters, and Mighty held an average of 140.4 quarters. The experiment showed that Viva was the strongest and Brawny was the weakest.

2999

THE EFFECTS OF DIFFERENT BEVERAGES ON HUMAN TEETH

N. Aivazova, E. Cueves, M. Hong, J. Morales, J. Osorio, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

The purpose of this experiment was to observe the effects of beverages such as: mineral water, Coca-Cola, water, black coffee, Sunny Delight, and pure lemon juice on teeth. Each tooth was placed in 25 drops of a specific liquid in a petri dish. Purified water was used as a control. We predicted that lemon juice and Coca-Cola would have the worst effects due to the acidity of lemon and the high sugar and caffeine levels in Coca-Cola. After a 24-hour period results were recorded as follows: water and mineral water had similar effects; both turned slightly yellow. Coffee and Coca-Cola both produced very visible and strong brown stains. The tooth submerged in Sunny Delight was in the process of yellowing. The tooth in lemon juice was also turning slightly yellow and tarnished, much like the one in mineral water. After 48 hours the teeth were taken out of the liquids and closely observed. The teeth which had been in mineral water and pure water had become more tarnished and yellow than at the 24-hour mark. Both teeth that were placed in Coca-Cola and coffee were stained and cracked. The tooth in Coca-Cola cracked down the middle, almost all the way through. Both substances stained the teeth a distinctive brown color. Sunny Delight turned the tooth to a very dark yellow color. Meanwhile, lemon juice decayed the tooth slightly and stained it a light yellow. These findings suggest that Coca-Cola and black coffee have done the most damage to the teeth. It can also be inferred that substances such as Sunny Delight, lemon juice, mineral water and water will slightly stain teeth, especially when the teeth are not cleaned on a daily basis.

3000

TYPE OF WATER THAT EVAPORATES THE FASTEST

Allyson Terry and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment dealt with the speed of evaporation of different kinds of water. Five different types of water were tested (tap, filtered, salt, sugar and bottled) and were left at room temperature for fourteen days. Evaporation level and amount left in each container were measured every fourth day and on the fourteenth day. Each water type was tested three times. The final (averaged) results of evaporation were: tap-45 mL, filtered-45 mL, salt-43 mL, sugar-44 mL,

bottled-48 mL. The results suggest that bottled water evaporates the fastest of the five waters tested in the experiment.

3001

DO *PSEUDOSINELLA VIOLENTA*, AN EYELESS SPECIES OF COLLEMBOLA, PREFER EATING GREEN COLORED YEAST AS OPPOSED TO YEAST IN ITS NATURAL BEIGE COLOR?

Omar Barraza, Attar Bhangal, Mitchell Steinfeld, and T. Miller (teacher). Holmes International Middle School, 9351 Paso Robles Avenue, Northridge, CA 91325.

This experiment was designed to see if an eyeless species of collembola prefer eating green yeast or yeast in its natural beige color. Based on previous experiments with ultraviolet light detection of eyeless collembola, we hypothesized that the collembola would prefer to eat the green yeast instead of the beige yeast. Collembola are tiny hexapods with a special jumping organ called a furcula which allows them to leap great distances for their size. Collembola environments were made for the experiment using a base of plaster of paris, charcoal and water in three petri dishes. The natural food for collembola is mold and in the laboratory they are fed yeast. We used liquid food coloring to make the yeast green and the natural yeast was moistened with an equal amount of water. The different colored yeasts were placed in each petri dish and fifteen collembola were placed in each environment. We observed the collembola using a stereomicroscope and recorded our data on a chart. The chart showed the number of collembola with a green gut and the number of collembola with regular colored guts. Our experiment did not prove our hypothesis correct as the collembola demonstrated no preference for eating the green colored yeast or the beige yeast.

3002

THE EFFECTS OF COMPETITION WITHIN RADISH PLANT POPULATIONS

O. Archila, M. Alberto, F. Avitia, G. Celis, O. Diaz, J. Espinoza, F. Jimenez, J. Juarez, J. Jurado, Y. Llamas, L. Macias, K. Martinez, J. Moreno, S. Mosqueda, I. Muhannad, D. Ortiz, D. Perez, J. Rivera, D. Rodriguez, L. Salinas, J. Singh, V. Villa, A. Xolalpa, C. Munoz, R. Sanchez, V. Ramirez, A. Rodriguez, R. Mariscal, and H. Nguyen, M.U. Tully (teacher). Mulholland Middle School, 17120 Vanowen St., Van Nuys, CA 91406.

The objective of this project is to involve sixth grade middle school students in a standards-based immersion project, that links both literacy and hand-on activities in the classroom setting. The students will learn the standards-based unit of ecology which incorporates interactions, such as competition, between living things in the environment, and will apply this knowledge as they test the effects of competition within populations of similar species of radishes in the classroom.

My students researched the effects of competition within a population of radish plants. The only condition that was varied in this study was the population size in each of the containers. The students grew radish plants in varying numbers, in each of the containers, simulating a pattern of geometric growth within a population (1, 2, 4, 8, 16 plants). They grew each population of plants in 1 cup of potting soil and watered the plants with 50 mL of water every other day. They added no new nutrients to the plants. The plants were exposed to the natural light and the fluorescent light of the classroom itself. The average height of the plants, for each population, was measured each day for two weeks. At the end of the study, the students were asked to graph the average height for each population over the two week time span.

My students found that early in the growth cycle of radish plants, radishes are aggressive competitors. The bigger the populations were in size, the taller the plants grew. As they compete for resources such as nutrients, light, water and space, the plants at the higher population sizes, on average, grew taller than the plants at lower population sizes until the 10th day of growth. After the 10th day of growth, after exhausting most of the nutrients within the soil, the plants at every population size begin to die. We conclude the limiting resource for the survival and continued growth of the radish plants is the level of nutrients in the soil, and without re-supplying the nutrients, all the populations of radish plants die.

3003

BEST TYPE OF INSULATOR

Jason Gonzalaz and D. Shah (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This experiment was done to discover which common, household material would make the best insulator. The four things that were tested were newspaper, bubble wrap, aluminum foil, and cardboard. They were each placed under a 12 volt 50 watt halogen light and the temperature underneath was recorded every five minutes for a half an hour. The temperature was recorded without any material as the control. Each experiment was repeated four times and the temperatures were averaged out. The temperature of the control rose 11.7 degrees C. The temperature under the newspaper rose 8.5 degrees C. The temperature under the bubble wrap rose 10 degrees C. The temperature under the aluminum foil rose 0.7 degrees C. The temperature under the cardboard rose 6.8 degrees C. These results suggest that aluminum foil is the better insulator.

3004

THE STRONGEST BRIDGE

Ali Maadelat and D. Shah (teacher). Portola Highly Gifted Magnet Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examines the question of what type of bridge can hold the most mass. Three different bridges were constructed (Concrete, Bowstring, and Suspension) and had weights dropped on them until they were bending slightly. This was tested 10 times and each time the concrete bridge held the most mass at $68\text{kg} \pm 2\text{kg}$. The weakest bridge was the suspension bridge, which held $42\text{kg} \pm 2\text{kg}$. The concrete bridge held 25 kg more than the highest weight of the suspension bridge.

3005

CONDUCTORS

D. Coleman, A. Harrison, M. Thompson, D. Watts, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

The purpose of this experiment was to find out if a compound could be used as a conductor and in addition, we wanted to know how much energy is produced using a voltage meter. Using the voltage meter and our three compounds, hydrochloric acid, vinegar and potassium nitrate (all 0.1 Molar solutions), we placed the copper wires into the each of the solutions. The results of our experiment are as follows: potassium nitrate generated 5.5 volts, hydrochloric acid generated 6 volts and vinegar generated 4.2 volts. In conclusion we discovered that a solution can be used as a conductor to produce energy and that hydrochloric acid is the best conductor of the three solutions.

3006

HOW WELL CAN A YOUNG ADULT FUNCTION VERSUS AN OLDER ADULT?

Kristin Shen and G. C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

In my project I experimented on how well different age groups, males and females could function by reading a chart with names of colors and with the colors opposite of the names of the colors. The purpose of this test was to learn who functions with both brain lobes more coherently and efficiently. In my project I used a stopwatch, a chart I generated, a data sheet and 27 willing participants. I had each participant read off the colors of the words, NOT the words themselves. I timed to see how fast their brain lobes would process the colors instead of the words they were trained to read. I repeated this so that my results would be accurate. I concluded that adults in their 20–30s did better than children in their teens and older adults. I also compared

males and females and learned that females were much more consistent and men varied from each other. My last result was that the second test had lower scores than the first one, which probably means the participant quickly learned how to take this test.

3007

EFFECTS OF DIFFERENT SUGARS ON THE AMOUNT OF CARBON DIOXIDE GAS PRODUCED BY A BAKER'S YEAST (*SACCHAROMYCES CEREVISIAE*) AND WATER SOLUTION

Devin Mirchi and M. Simonds (teacher). Portola Highly Gifted Magnet Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examined the question of which sugar, in a series of Dextrose, Sucrose, Fructose, and Aspartame Sweetener would produce the most Carbon Dioxide gas if diluted in a solution of distilled water and baker's yeast (*Saccharomyces cerevisiae*). The solutions were created using lukewarm distilled water, to speed up the chemical reaction, and the reaction was allowed to take place in approximately 12 hours. The experiment was repeated three times and results recorded. The sugar which produced the most gas (in cubic cm) was Sucrose (107.42), followed by Dextrose (92.95), Fructose (87.41), and the Aspartame Sweetener (50.96), all followed by the control, which remained at zero. The results suggest that the best sugar to use in a baked good would be sucrose, because of its ability to react with *Saccharomyces cerevisiae* to produce the most carbon dioxide, which causes the "air bubbles" to form in rising bread.

3008

pH LEVELS OF DIFFERENT FRUIT JUICES

Dorian M. Rendon and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment shows how much acid is in different types of fruit juices. The concentration of acid in each of the drinks (orange, apple, pineapple, lemon, cherry, apple cherry banana, and apple strawberry juice) is determined with pH paper. The juices were tested several different times with the pH paper. The most acidic juice was lemon which had a pH of 2. The juice containing the least amount of acid was apple strawberry which had a pH of 5.

3009

IT'S GETTING HOT IN HERE

Beverly Sanchez, Lauren Carreon, and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

In this experiment we exposed different types of plants to O₃ (ozone) and also to different temperatures. The purpose of this was to see the effects of ozone in above average amounts. The use of different temperatures was to see the effects of global warming on pigmentation. Ozone is normally in amounts of 0.008 ppm (parts per million). We increased the levels of ozone of 0.50 ppm. We did this to three separate greenhouses at 4, 8 and 12 days of germination leaving one greenhouse untouched as my control. We extracted chlorophyll from all the plants and then ran a thin layer chromatography test. There was a significant reduction in the amount of chlorophyll in the leaves of plants exposed to ozone. The temperature did not have any effect in the amount of chlorophyll and other accessory pigments found in the leaves.

3010

IF *DROSOPHILA* FLIES HOMOZYGOUS RECESSIVE FOR EYE COLOR ARE CROSSED WITH FLIES HOMOZYGOUS RECESSIVE FOR WING MUTATIONS, ARE THE RESULTS PREDICTABLE BASED ON MENDELIAN GENETICS?

Esmeralda Alvarez, Arpi Arman, and Oryla Wiedoeft (teacher). San Fernando High, 11133 O'Melveny Avenue, San Fernando, CA 91340.

The question we addressed with our research was, if we crossed *Drosophila* flies homozygous recessive for eye color with flies homozygous recessive for the wing mutations held-out, apterous and vestigial, could we predict the phenotypic outcomes based on Mendelian genetics?

The method we used was to cross virgin flies, one homozygous recessive for white eyes, with one homozygous recessive for a wing mutation. We each investigated a cross between a fly with white eyes and one wing mutation. We recorded and compared our results.

We found that we got close to the predicted 9:3:3:1 ratio for the F₂ generation. However, we also observed multiple, unpredicted, unusual phenotypes. We observed variations in body shape, body color, wing shape, and wing size. We felt these variations could be due to a multitude of factors. Our unexpected results prompted us to undertake further experiments.

We predicted that the unexpected phenotypes may be caused by pleiotrophy (or different types of expression of the same gene), or due to temperature variation. In the experiments we are in the process of concluding, we are investigating these questions.

3011

DOES EXERCISE AFFECT BODY FAT?

Nicole Melancon and G. Zem (teacher). Lawrence Middle School Gifted Magnet, 10100 Variel Avenue, Chatsworth, CA 91311.

This research study compares the body fat of girls who rarely exercise and girls who exercise regularly. I chose this topic of research because I've noticed that a lot of research is going on concerning body fat in teens and wanted to do something similar to draw my own conclusions on this research topic. I used a total of twenty-six girls, thirteen for each group and they were thirteen to fourteen years old. The group I measured who exercise regularly consisted of girls from my year-round soccer team, while the other group was girls from Lawrence Middle School who don't exercise normally. To measure them I used body calipers and precisely measured the back of their right arms, copying down the information I gathered. Averaging in all the measurements for each group I learned that girls who exercise regularly have about seventeen millimeters of fat while girls who exercise little to none have an average of twenty millimeters of fat. As shown, girls who exercise generally have less fat than girls who don't exercise outside of physical education in school.

3012

EFFECTS OF MUSIC ON HUMAN MEMORY

Ashwin Thomas and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356-3313.

This study examined the question of possible changes in memory to humans when exposed to music. Each subject was tested twice, three trials in each test, and shown exactly three different sets of 20 pictures, while being exposed to either no music or 7 types of music, for anywhere near 3–4 minutes (depending on length of song). The 7 types of music that each subject may have been tested on included "classical," "rock," "jazz," "metal," "gospel," "pop," and "rap" music. The subject was then asked what he/she remembered, and the amount of pictures remembered was recorded and scaled. The score was calculated by the average number of pictures remembered on the 3 different tests. The average of the tests was then proportioned into 10, or divided by two. For example: 16 out of 20 would be scored as 8 out of 10. The scores were scaled from 1–10: anything from 0–5 was "Bad," anything greater than 5 and less than 8 was "Average," and anything from 8–10 was "Excellent." Also, subjects were aged from around 10–25 years of age, so that the different subjects' memory span weren't very different. After several trials, the results suggest that classical, non-hard rock, and jazz music seemed to increase the memory, rap and metal music seemed to greatly decrease the memory of subjects, and that pop and gospel music didn't seem to affect the subjects, for test results showed that the number of pictures remembered stayed the same as if they weren't listening to music.

3013

HOW MUCH NUTRITION IS ENOUGH NUTRITION?

Araceli Arriaga, Jesse Dinka, Eric Flores, Moises Hernandez, Richard Impellizine, Greg King, Rosa Mendez, Gustavo Mora, Antonio Munn, Richard Oliveros, Angel Pereyra, Sergio Pol, Bianca Prieto, Eric Salcido, Ryan Taylor, Freddy Tlatenchi, and Daniella Williams (teacher). North Hollywood High School, 5231 Colfax Avenue, North Hollywood, CA 91601.

The purpose of this study was to find out if more or less nutrition is good for a plant to grow. We think the plants will grow more with more nutrition. We planted two Wisconsin Fast Plant (*Brassica rapa*) seeds in 38 different containers, with various concentrations of Osmocote® nutrition pellets. The concentrations we used were: 1x, 2x, 4x, 6x, 8x, and 12x. We observed different changes and heights over a nine day period. The average growth for the various concentrations were 24.2 mm for 1x; 25.2 mm for 2x; 27.6 mm for 4x; 28.2 mm for 6x; 28.6 mm 8x; and 28.8 mm for 12x. We concluded from our data that our hypothesis was correct.

3014

TESTING THE EFFECTIVENESS OF SOME 'ARTIFICIAL' SWEETENERS USING THE STANDARD MICROBIAL LAVA LAMP® (MLL) PROTOCOL

D. Cohen, J. Garcia, B. Koffi, A. Liberman, J. Whatley, and D. Gaughen (teacher). Taft High School, 5461 Winnetka Ave., Woodland Hills, CA 91364.

We conducted the standard Microbial Lava Lamp® (MLL) protocol developed by King and Tomasek. We replicated the protocol for seven different sugar (sucrose) concentrations. We found that the best performing concentration was a 10% sucrose solution. Performance was based upon generated CO₂ bubble counts and the number of successful rising and falling yeast/alginate/glass beads over time. The 10% sugar solution served as the standard (control) to test and compare the performance of *Stevia Plus*®, a naturally occurring sweetener, and *Sweet'N Low*®, an artificial sugar. Nutrition facts from the manufacturers of a diet soft drink revealed that one gram of their sweetener was equivalent to 21 grams of sucrose. We therefore added 5 packets (5 grams) of each artificial sweetener to one liter of water to create the 10% "sweetener" standard. We predicted *Stevia Plus*® would not perform as well as *Sweet'N Low*® because it was noted that *Stevia Plus*® retards *Candida albicans* (yeast) growth. We found *Sweet'N Low*® closely approximated the 10% sugar solution in CO₂ bubble generation and successful yeast/alginate/glass beads. No productivity was observed in the *Stevia Plus*® solution. This confirmed our prediction. However, further tests using the MLL® are needed to ensure the accuracy of our results for these two sweeteners.

3015

WHICH IS A BETTER CONDUCTOR: ALUMINUM OR COPPER?

Robert Garcia and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment discovered whether aluminum or copper was a better conductor by testing which metal got hot faster. The two wires were tested with two light bulbs and scanned with the heatscan gun to see the temperature. They were tested separately over a span of 4 minutes, being checked once every minute. Each experiment was tested 3 times for each wire, a total of six repetitions. The results suggested that aluminum was just as good a conductor as copper because it heated up at *about* the same rate, both managing to light the light bulb.

3016

EFFECT OF pH ON SEA URCHIN FERTILIZATION

Bernard Cadiz, Nelson Solares, and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Acid rain and other pollutants may change the pH of the ocean and adversely affect marine life. We were interested to find out whether a pH change would affect the fertilization of sea urchins. In this experiment we used male and female *Strongylocentrotus purpuratus* sea urchins. The sea urchins were injected 3 times with about 0.5ml of 0.55M KCl in three points of a triangle around the mouth into the body cavity. The urchins were held upside down and checked for gamete shedding. White spawn indicated male and yellow/orange spawn indicated female. The male was placed upside down on a petri dish placed on ice. The female was placed upside down on a small beaker filled with artificial seawater (ASW) pH 8.0, so that the eggs can fall into the ASW. Eggs were collected and washed with ASW 3 times. 3ml of ASW at pH 5, 7, 8 or 9 were put in a small petri dish. A small drop of concentrated eggs was added to it. Each petri dish was observed under the microscope. A drop of diluted sperm was added to the petri dish and the stopwatch was started. The time required for eggs to be fertilized was recorded. Two or three fields were counted for the total number of eggs in that field and the total number of eggs fertilized for each of the different pH. We found that almost all the eggs were fertilized at pH 8 within two minutes. At pH 7 almost all the eggs were fertilized within two and a half minutes. At pH 9 almost all the eggs were fertilized within three and a half minutes. We observed the eggs and sperm at pH 5 for 30 minutes and found no fertilization. In the pH range studied it seemed that pH 8 is the best for sea urchin fertilization. A neutral or alkaline pH is better than acidic pH for sea urchin fertilization.

3017

USING A MINIRESPIROMETER TO STUDY THE EFFECT OF TEMPERATURE ON THE RATE OF RESPIRATION OF MEALWORMS

Amy Sen, Yessenia Salmeron, and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

We were interested in finding out how temperature would affect the respiration of mealworms. We used a minirespirometer to measure the respiration of the mealworms. The minirespirometer was made up of a vacutainer tube containing a capillary tube filled with 0.1% phenol red. The phenol red changes color in acidic and alkaline pH and so it changes color with carbon dioxide. We weighed two groups of mealworms and put them in the minirespirometer and left them at 4°C and 22–24°C for 24 hours. Then we measured the color change. Alongside we ran controls with no mealworms in the minirespirometer. No color change was observed in the controls. We exposed another group of mealworms to 30°C for 2 hours and then left them at 22–24°C for 22 hours. The rate of respiration was calculated as color change in mm/g body weight. We found that at cold temperatures (4°C) the average rate of respiration was 23mm/g body weight, whereas at room temperature (22–24°C) the average rate was 70mm/g body weight. The short exposure at warm temperature (30°C) increased the average respiration rate to 103mm/g body weight. Our experiment shows that the respiration rate of the mealworms is increased with the increase in temperature.

3018

HOW LONG BATTERIES LAST

Galina Tucker and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study tested which brand of batteries last longest. The three brands tested were Duracell, Maxell, and Energizer. A pair of each was placed into a battery-powered toothbrush, which were all turned on simultaneously. Time was noted when they stopped. The test was then repeated two more times. The results showed that the cheapest brand, Maxell, was notably better than Duracell, which came in second, and Energizer, which came in last.

3019

WHICH FORM OF INSULATION WORKS BEST?

Michelle Lukiman and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment was conducted to test the insulating abilities of cotton, feathers, human hair, thermal insulation, and thermal clothing. Six cups of water were heated to 55° Celsius, and then poured (in equal amounts) into six different jars. The jars were covered, and then one jar was placed in each of six plastic bags. Each of the bags was lined with a different insulating material, with the exception of one bag that served as the control of the experiment. The bags were placed in a refrigerator (other cooling devices could be used), while the temperatures of the water in the jars were recorded every 30 minutes. The experiment was repeated another two times. After 120 minutes, cotton was able to keep the water temperature around 10° above the control. Feathers were able to keep the temperature about 8° above the control. Human hair and thermal insulation appeared to have kept the water temperature about 7° above the control, while thermal clothing only kept the water warmer by 3°. Cotton appears to have the best insulating ability, while thermal clothing provides the least insulation of the five materials.

3020

EFFECTS OF DIFFERENT LEVELS OF CARBON DIOXIDE ON GREEN PLANTS

Joseph Johnson and M. Simonds (teacher). Portola HG Middle School, 18720 Linnet Street, Tarzana, CA 91356.

These studies answered possible growth changes in green plants due to higher or lower levels of carbon dioxide. Five peace lilies were grown in surrounding air with higher percentages of carbon dioxide, another five in lower, and five others in normal air. All plants were grown in the same surroundings other than the changes specified. The results observed show that green plants grown in air with higher percentage levels of carbon dioxide grow faster and larger, while green plants grown in lower levels grow slower and smaller.

3021

WHAT IS THE BEST WAY TO REMOVE GUM?

Brianna Brostoff and Gregory Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Street, Chatsworth, CA 91311.

This study explored various ways to remove chewing gum from shoes. Five methods of gum removal were tried: freezing, peanut butter, turpentine, and two products which can be purchased at hardware stores, Goo Gone and Goof Off. The various methods were tried in order to remove the gum after it was on the shoe for 10 minutes. The experiment was repeated with

gum that had been on the shoe for one hour. Both sugarless and sugar gum were used. All of the methods and substances used removed the gum from the shoe. Using peanut butter and turpentine removed the gum, but they were messy and smelly. Freezing worked but it was difficult to freeze the gum. The Goof Off and Goo Gone chemically removed the gum and they were both effective gum removers. The results suggest that there are a variety of ways to remove gum from shoes. All of the materials and methods used successfully removed the gum. However, Goof Off and Goo Gone worked most effectively. I conclude that Goo Gone is the best gum remover because it works well and it has a pleasant citrus scent.

3022

THE RELATIONSHIP OF A PARAMEDIC'S HAND SIZE TO THE VOLUME OF AIR PUMPED OUT OF AN AMBU-BAG

Chelsea Weber and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment project studies whether the size of the hand of a paramedic determined the volume of the air exerted out of an Ambu-bag. A nozzle was made out of tape and thin cardboard that was taped to a small garbage bag. A hand was measured from middle finger to thumb, and that hand then squeezed the Ambu-bag once. The air was trapped in the bag by two clips. The bag was then pushed into a bowl that was filled with water and the displaced water caught in a pie pan underneath. The water was then measured in a graduated cylinder. Results suggest that the size of the hand was not a major (or not at all a) factor in determining the volume of air pumped through an Ambu-bag.

3023

THE EFFECT OF PRESERVATIVES ON BACTERIAL GROWTH

Justin Cruz and Wendy Mayea (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

Bacteria is all around us on everything we see and touch, and even in the things that we eat and drink. This research was to test the effect of the bacterial growth in liquid. To conduct the research, I dissolved one cube of chicken bouillon in a cup of warm tap water. Then, I divided the solution equally into three glasses. I then added 5ml of table salt to one glass, and 5 ml of white vinegar to the second container. I only used water in the control. The results were the bacteria grew best in the control as indicated by the solution being the cloudiest at the end of the experiment. Vinegar stopped the growth of bacteria the best because this container was the clearest.

3024

ARE DIFFERENT LIQUID ANTACIDS EQUALLY EFFECTIVE?

A.J. Trott and G.C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This study examined the relative effectiveness of nine different liquid antacids in neutralizing hydrochloric acid, which is released in the stomach to digest food and kill bacteria. When the stomach releases too much acid, it can cause heartburn. Antacids neutralize the excess hydrochloric acid and reduce the discomfort. The contents of the stomach were simulated by combining 10 ml of water and 5 ml of dilute (3.5%) hydrochloric acid. Three drops of bromophenol blue were added to the solution. Bromophenol blue is a pH indicator that is yellow when the pH is less than 3.0 and purple when the pH is more than 4.6. One of the antacids was then added a little at a time until there was a color change (to purple) lasting at least ten seconds. The amount of antacid was then recorded, and the simulation was repeated another 4 times for that antacid. The whole process was then repeated for eight other antacids as well as water, a control group. By comparing the amounts needed of each antacid to neutralize the acidic solution, I was able to rank the antacids from most to least effective. Some of the antacids used with the same active ingredients showed that those with higher concentrations of active ingredient were indeed more effective. However, there does not seem to be any relationship between the amounts of different active ingredients in each different antacid. The concentrated aluminum hydroxide gel and the milk of magnesia were the most effective, requiring the least amounts of antacid to neutralize the acidic solution. The Iosopan was the least effective, requiring more than four times the amount of antacid to neutralize the same solution than the two that were the most effective. The tap water did nothing to neutralize the acid, at least up to 125 ml. The fact that they are not equally effective does not mean that the most effective antacid is or should be the most popular or widely used. Other factors, such as taste, advertising, packaging, and price are considered before a person purchases a particular antacid.

3025

DIG IN SITU HYBRIDIZATION OF IL-6 FAMILY OF CYTOKINES MRNA IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Emily Wu and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Blvd., Woodland Hills, CA 91367.

The purpose of my research is to investigate the expression of IL-6 Family of cytokines gene in the zebra fish with use of In situ hybridization on mixed pool embryos. A hybridization reaction is carried out using an allele sequence-specific oligonucleotide to characterize and identify complementary allele nucleotide sequences in different developing stages of zebra fish embryo. Two IL-6 oligonucleotide probes are derived from two different conserved nucleotide sequence specific loci of adult zebra fish brain and fin tissue. The IL-6 DNA allele nucleotide sequence spe-

cific oligomers are synthesized using an Applied Biosystems 3948 DNA synthesis and purification system.

Hybridization begins with embryo fixation. It must first be preserved in benzylaldehyde, thereby preventing necrosis of the embryo tissues. The zebra fish embryos are first treated with Proteinase K in a Proteinase K Buffer at room temperature. This generates holes in the cell membrane, creating a pathway to the cytoplasm. After gently washing, the embryos are pre-hybridized in pre-hybridization buffer at 65°C for 5 hours. Afterwards, the pre-hybridization buffer is replaced with fresh hybridization buffer containing the DNA oligomer probe. Our probes require annealing since it is a double-stranded complementary DNA. After hybridization, the embryos undergo several vigorous washes in SSC at room temperature to reduce background. In order to prevent the binding of unspecific binding sites on the remaining cell membrane, the embryos are blocked with Boehringer blocking reagent in maleic acid buffer at 65°C under constant agitation. The embryos are then incubated with anti-digoxigenin antibody diluted to a final concentration of 1 to 1000 in TBST containing 2% Boehringer blocking reagent for two hours. Next, the embryos are stained using NBT, a dye, as well as BCIP in an alkaline phosphatase buffer, pH 9.6, and are developed in the dark for two to twenty hours, depending on the abundance of RNA. The products became visible within a couple hours. When the reaction had proceeded to our satisfaction, it was quickly stopped to prevent excess background. It was then re-fixed in benzylaldehyde to prevent necrosis. To visualize the embryos with a microscope, the embryos were first dehydrated in 100% methanol, cleared in methysalicylate, and then mounted in Permount. The microscope slides are viewed and projected onto a screen and photographed for analysis.

3026

THE EFFECT OF MUSIC ON A STUDENT'S LEARNING

Cristal Valdez, Gabriel Griego, and Wendy Mayea (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

The research question was "how does music affect student's learning?" The purpose of the experiment was to find out the effect of music on students' learning and if music helps students learn or if it just makes their learning power weaker. The hypothesis is that music does affect a student's learning power. The materials used for the experiment were students, a test, and rap music. The procedures were to put two groups of students in different rooms. One room would be quiet and in the other room rap music would play. Students would read a book, then take a test based on their reading. The results of the experiment were that fifty percent of the students got 100% of the answers correct. The students who scored 100% did not listen to music. The students listening to rap music scored an average of 75% of the answers correct. In conclusion, the hypothesis was supported because it shows that music does affect a student's learning power. The information in this experiment is important because some students like to listen to music while studying or reading and they should know if listening to music would affect their learning power.

3027

WHICH TYPE OF SOIL MAKES PLANTS GROW FASTER?

Jessica Matos and M. Simonds (teacher). Portola Middle School 18720 Linnet Street, Tarzana, CA 91356

This experiment tested different types of soils to find out which soil would make a plant germinate faster. *Raphanus sativus* (radish) seeds were placed in cups using four different types of soil, topsoil, potting soil, and organic planting soil. They received the same amount of sunlight and water and were measured every day to see any growth change. The experiment was tested four times and topsoil proved to be the soil that made the plants germinate fastest.

3028

THE MAXIMUM AMOUNT OF GRAMS A WET PAPER TOWEL CAN HOLD

Navid Nazer and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined the question of what brand of paper towel is the strongest. Sixty-five to seventy AA batteries were collected and used for the weights for each paper towel. Next a sheet of paper towel was drizzled with water until covered completely and firmly held by the assistant. After the paper towel was ready a single AA battery was placed in the center of it, another was placed every two seconds. The batteries were placed down in a row so that the pressure would be distributed throughout the entire sheet instead of just all the weight being in the center. That was continued until the paper towel ripped, then the results were recorded and it was done again with the same brand of paper towel to ensure accuracy. In all it was done five times with each brand. The results suggest that Scott paper towel was the strongest followed closely by the Mighty brand. Bounty had the same maximum hold as Mighty but other tests proved not as successful for Bounty. Next came the Kleenex paper towel which was right behind Bounty. Finally came the Vons Generic Brand (which was priced a little less than the rest) so a person could argue that price was a factor.

3029

EFFECTS OF VARYING FACTORS ON RATS IN A MAZE

Youngshin Lee and D. Shah (teacher). Portola Junior High, 18720 Linnet Street, Tarzana, CA 91326.

This experiment was done to find out if rats respond to different factors of the environment. Six different environmental factors were set up and 12 trials were done with each one. The 3 rats did 4 trials for each factor, adding up to 72 total runs. Each rat was timed for each run in minutes and seconds and the times were recorded. As a result, the rats took the shortest time to run

the maze in environmental factor A, Day + Dark and the longest for D, Night and Bright light. Overall, the rats did better in the day than the night and in the dark.

3030

EFFECT OF ACID RAIN ON GOLDFISH

Armando Castillo, Amar Billoo, and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Large amounts of dissolved sulfur dioxide and nitrogen oxides in the atmosphere may result in acid rain, which may alter the pH of the streams and the rivers. Change in the environment may affect the habitat of aquatic animals. We were interested to find out how goldfish would react to an alkaline and an acidic environment. We took three bowls containing fresh water and divided them into three groups. In group 1 we added nothing. In group 2 we added baking soda and in group 3 we added lemon juice. We put one goldfish in each bowl and counted the tail flaps per minute. We made three observations for each group for each experiment. We repeated the experiment twice. In the first experiment the controls had an average tail flap of 118/minute. In the presence of baking soda the tail flaps/minute decreased to 100/minute and in the presence of lemon juice the tail flaps increased to 175/minute. In our second experiment the controls had 143 tail flaps/minute, the baking soda group had 69 tail flaps/minute and the lemon juice group had 201 tail flaps/minute. We found out that an alkaline environment slows down the tail flaps and an acidic environment increases the tail flaps in the goldfish as compared to fresh water. Our data suggests that acid rain may not be good for the well being of goldfish.

3031

4TH AND 5TH GRADE STUDENTS EXPLORE THE EFFECTS OF ALTERED HABITATS AND VARIATIONS WITHIN ECOSYSTEMS

Benny Adigheji, Tania Alonso, William Benito, Edgar Carbajal, Cristobal Calderon, Luis Delgado, Agby Escobar, Jimmy Fernandez, Christian Figueroa, Carlos Garay, Richard Garcia, Jocelyn Gonzalez, Luis Hernandez, Dominique Hopkins, Breana Lucario, Charlie Luna, Dsean Lucerne, Charvonna Marshall, Frank Mariano, Bryan Mota, Angel Ramirez, Cristina Rayo, Bronik Sardaryan, Alisa Sutton, Darryl Tolbert, Christopher Williams (Jean Lui, teacher), (Cathy Coyle-Thompson, Ph.D., Eisenhower Grant Mentor, CSUN). 24th Street School, 2055 West 24th Street, Los Angeles, CA 90018.

Since January 2003, we have been studying how living things interact with each other and their environment. Since this is an El Niño year, we decided to study how the warming of waters off the coast of South America impacted radical changes in weather patterns throughout the world. We started by learning about the natural rainforest and how changing and depleting it affects the world and the people in it. We then studied the Brazilian rainforest and how the loss of mass acreage has affected the environment and weather patterns on a global scale. We began

to wonder: if big changes in habitats cause big problems worldwide, then would small changes in a habitat cause small problems in an environment close to us? We pondered and ruminated over the old saying that a butterfly flapping its wings off the coast of Africa may cause a hurricane in the Caribbean.

Conducting our experiment on a much smaller scale, we went out to the schoolyard and collected ants and ladybugs. We observed them by creating little colonies of each insect and studied and learned what they each do and how they live within their own ecosystem. We learned that if these insects/animals do their jobs, then not only have they helped to maintain their respective habitats, but they have helped to sustain balance in the environment. We learned that the slightest variance in each terrarium could have an overall effect on the entire colony. For instance, if we took the seemingly more productive ants from the ant ecosystem, chaos and disorder seemed to ensue within the remaining population. At recess, a few of us collected some ladybugs and put them in jars with some grass and a little bit of water. We poked holes in the lids to make sure they had air. We observed that the ladybugs only survived for a few hours in the jars; we wondered why. When asked this question, our teacher, Mrs. Lui, challenged us to conduct a scientific investigation.

We also participated in an experiment with Mr. Montgomery's second grade class in February. The question for their project was: "Are there animals in our environment that we can't see?" Most of us hypothesized that we would find bugs, worms, lizards, ants, germs, fleas, snakes, cockroaches and things too small to see. We divided our schoolyard into quadrants, then collected leaf litter and topsoil from several sites and placed it into large tin cans. We all found evidence of a variety of animal life, but the most interesting was found under a tree in the east quadrant. It wasn't obvious at first, but we found tiny living things by looking at the soil through magnifying glasses and microscopes. We found collembola, which are microorganisms that live off the fungi that decompose organic matter. We also found collembola in the leaf litter after shining a light on it for several minutes.

After considering our findings, we asked this question: "What will happen to collembola if they are removed from their natural habitat?" Most of us hypothesized that they would face the same fate as the ladybugs and ants. A few of us hypothesized that the collembola would survive because they are so small they could adapt to a new or altered environment.

We harvested the collembola and placed them in baby food jars. Dr. Coyle-Thompson, Mrs. Lui's mentor, suggested that we line the jars with charcoal and plaster which would be a new habitat, similar to a terrarium. Dr. Coyle-Thompson recommended that we provide the collembola with 7 milliliters of distilled water and some yeast, a food source, every few days. The habitats that we provided for the collembola, inside the baby food jars, contained either leaves, soil (which became mud after we added the water), or water only. Our control group was baby food jars filled with 7 milliliters of distilled water and yeast added every few days. The control group jars did not have a charcoal and plaster base.

The results of our experiment are as follows. To date, the collembola that were placed in their new habitat, in the charcoal and plaster based jars with yeast and distilled water added every few days, are still living. The collembola that were placed in the jars containing soil died

within two days. We think they got buried in the mud. The collembola that were placed in the jars with leaves died within five days. We're not sure why. The collembola that were in the control group died within fourteen days. Our research indicated that collembola have the nickname springtails because they jump ON the surface of the water. We think they died in the control jars because they can't live IN the water.

Our conclusion is that there is an adverse effect for the survival of microorganisms (like collembola) and insects (like ladybugs and ants) when their natural habitat is disturbed. We believe what Luther Burbank, an author/environmentalist, said is true: "Nature's laws affirm instead of prohibit. If you violate her laws, you are your own prosecuting attorney, judge, jury, and hangman." We are now much more acutely aware and fearful of human made changes to our planetary ecosystem such as the depletion of the ozone layer and the burning of the Brazilian rainforest. These are topics we're going to continue to explore for our science fair projects in middle school.

3032

THE EFFECTS OF ACID RAIN ON PLANT GROWTH

Cherise Shikai and M. Simonds (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356-3313.

This experiment is testing what kind of effects acid rain has on plants. *Raphanus sativus*, radish seeds, are being watered with different solutions with varying pHs. The solutions are made with distilled water and distilled white vinegar to imitate acid rain. There are 5 solutions. Solution #1 is pure vinegar which has a pH of 2. Solution #2 is made up of 10mL of vinegar and 90mL of distilled water which has a pH of 3.5. Solution #3 is composed of 1 mL vinegar and 99 mL of distilled water and has a pH of 4. Solution #4 is pure distilled water which has a pH of 5, and solution #5 is bottled water with a pH of 6. These plants have been watered with 25mL every 5 days and the effects have been recorded for 15 days. The results have shown that the plants with lower pHs have had growth and health problems. The plants watered with higher pHs have grown healthy and fast. But the plant that grew the most was the one watered with distilled water.

3033

THE EFFECT OF CAFFEINE ON THE GROWTH OF RADISHES

J.M. Gelzer and G. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This study examined the advantages or disadvantages of growing plants with a liquid containing caffeine. Twenty-five cherry-belle radishes were watered with coffee for the experimental group; and twenty-five cherry-belle radishes with water, for the control group. Each plant received equal amounts of water or coffee and were planted in a nutrient enriched soil. The

experimental group of radishes which were fed with caffeine did not flourish. A few of the coffee plants began to grow, but over time they became brittle, weak, and droopy. All of the plants in the control group, which were given water, grew to be radishes. The results suggest that caffeine inhibits or destroys plant growth. In conclusion, caffeine is bad for the plant for several reasons. First, the adenosine was interrupted. The adenosine gives the plant energy. Caffeine and adenosine have similar structures. The adenosine links onto cells that the adenosine is supposed to link onto. Caffeine then interrupts adenosine's job of giving the plant energy. Since the plants didn't have energy they couldn't grow. Another reason that caffeine is bad for the plant is because coffee has a lower pH level than water, making it acidic. This is not good for the plant because it buffers the soil, which creates a poor living condition for plants.

3034

IS THE DIGESTIVE TRACK OF A SPECIES COLLEMBOLA ACIDIC?

Anthony Partida and T. Miller (teacher). Parkman Middle School, 20800 Burbank Blvd., Woodland Hills, CA 91364.

It is my hypothesis that I can find an indicator to tell if the digestive track of a species of a collembola, called *Onychuridae encarpatus* is acidic because similar experiments have been done with flies. Collembola are microscopic, six legged arthropods. They also have something called a furcula, which allows them to jump large distances. This experiment was performed by placing about 25 collembola in two separate petri dishes. The petri dishes were prepared with plaster of paris, charcoal and water dried base. Water was also added to the ground of the petri dish to make a damp environment for the collembola. I fed one group yeast with water and the other yeast with phenolphthalein. I tried the same experiment with boiled cabbage juice and diluted by $\frac{1}{4}$ phenol red. Using a stereomicroscope, I carefully observed the collembola. I collected data by counting the number of collembola, which had a change of color in their guts. My data showed that I could not find an indicator to tell if the digestive track of the *Onychuridae encarpatus* is acidic. This was because no color was observed in the gut of the Collembola, in any of the experiments. My hypothesis was incorrect.

3035

THE EFFECTS OF WATER TEMPERATURE ON FISH SURVIVAL

Michael Chan and Mrs. D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the survival probability of feeder goldfishes in a cold temperature environment that is close to 0°C. In each set of tests, ten (10) feeder goldfishes were observed in a thermally isolated water tank where the temperature was kept at a constant level for four days with the use of a chiller. The numbers of fishes that survived at that particular temperature were recorded at different intervals over the four-day test period, and the percentage of

the surviving fish was calculated. By plotting the experimental data at 2.5°C, 10°C, and 0.5°C, the critical temperature for a 100% survivability rate for the fish to survive was 1.25°C. Below that critical temperature, the probability is proportional to the water temperature in degrees Celsius.

3036

WHAT BRAND OF PAPER TOWEL IS MOST ABSORBENT?

Angelo Yuri and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91156-3313.

The experiment tested which brand of paper towel was the most absorbent. One sheet was taken from each brand, 100 milliliters of room temperature water were poured on one of them. After 30 seconds, the water was squeezed out into a graduated cylinder, was measured, and then recorded. This was done with each brand of towel. This whole process was repeated three times. In the results, Kirkland Signature is the most efficient brand, then Bounty, then Brawny, then Springfield, and Mardigras is the least efficient.

3037

THE EFFECTIVENESS OF COMMON PACKAGING MATERIAL

Jin Yoo and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91156-3313.

This study tested various packaging material to see which material will work the best. Eggs were dropped from a height of 1 meter onto a concrete floor. Each egg was packed with a different material (tissue paper, cornstarch pellets, bubble wrap). Each type of egg went through 5 trials consisting of 5 eggs each. The number of surviving eggs (no cracks) were recorded. Tissue paper had a 48% egg survival rate, bubble wrap with a 16% survival rate, no packaging had a survival rate of 8%, and cornstarch pellets had a survival rate of 48%. These results suggest that object packed with tissue paper and foam pellets can protect the object better than bubble wrap and objects with no packing.

3038

YEAST FERMENTATION

Albert Shih and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

The lab that I have done is one that has to do with yeast and sugar. This study will show what happens when different amounts of sugar are added to yeast. The materials I used include 3 packages of yeast, warm water, 3 clear 16-ounce plastic water/soda bottles, funnel, 3 balloons,

rubber bands, and a variety of sugary liquids, but also a control. What I did here was take 3 empty 16-ounce bottles and added warm water, just about $\frac{1}{4}$ of the way. Then I added a package of yeast and the sugary liquid that I had chosen. Then I put a balloon over it and secured it with a rubber band and finally the balloon should inflate. And it did. I found out through a process called fermentation, that the bottle with the highest amount of sugar created the most byproduct, which includes ethanol and carbon dioxide.

3039

ISOLATION OF TOTAL RNA IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Lynn Lee and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Blvd., Woodland Hills, CA 91367.

The purpose is to isolate total RNA in zebra fish developing stage mixed pool embryos. An RNA Extraction Kit from Ambion Corporation is used to optimize the RNA extraction. Our dry ice RNA Extraction protocol begins by adding Chelix solution and Proteinase K/PKDB cocktail to each developing stages embryo. The mixed pool embryos are boiled for several minutes. The tissue is digested with the Proteinase K and solubilized in a guanidinium-based RNA Extraction Buffer to protect against RNA degradation. The Acid Phenol and Chloroform extraction procedure elutes the RNA from other cellular components. The extracted total RNA is precipitated in isopropanol and linear acrylamide. Linear acrylamide coprecipitates the total RNA and maximizes the recovery of minute amounts of RNA. DNase I along with nuclease-free water and a reaction buffer is then added to digest contaminating genomic DNA in the RNA preparation. The most critical variables that influence the outcome of RNA extraction include the time between death of the organism, immersion of the embryo in a fixative to minimize cell lysis and RNA degradation by endogenous ribonuclease, as well as the fixation type and time.

3040

WHICH TYPE OF INSULATING MATERIAL KEEPS A HOUSE THE COOLEST?

Isabel Hittleman and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined which insulating material, when inserted into the roof, kept a house the coolest. A house was constructed with four walls and a floor made of Lucite, and a roof made of double cardboard surrounded by wood. Each of the five insulating materials was inserted into the roof with a 120-watt floodlight shining over it for twenty minutes. The temperature of the box before and after each material tested was recorded along with the room temperature before and after each test. Each test was repeated four times. In the results from this experiment Styrofoam worked the best, cotton fabric and metal second, third was fiberglass, and fourth was foam rubber. The control, a double cardboard frame with four holes in it, allowed the box to raise five degrees Celsius. Based on this experiment Styrofoam performed the best as an insulating material.

3041

HOW DOES TEMPERATURE AFFECT THE GROWTH OF MOLD IN FOOD?

Hope Milazzo and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Mold is a fungus that grows in warm and humid conditions. Mold body is made of roots. Roots are threadlike and invade the food to form spores. The spores cause the color of the food that is molded. The color of mold infection may be green, brown, yellow, white, black and in some cases blue. Since mold grows in hot and humid conditions we predicted that mold would grow faster in warm temperatures and humid conditions. In this study we used apples, bananas and bread. We put each food item in a baggie and placed one baggie in the refrigerator and the other out on a wooden board in the patio. We recorded changes in the food items for 7 days. We repeated the experiment. We found that the food that had been placed outside in the patio molded faster than the same food item placed in the refrigerator. The closed baggie had accumulated moisture from the food item. Our results show that mold grows faster in hot and humid conditions.

3042

SECOND GRADERS EXPLORE ANIMAL KINGDOM—“ALL CREATURES GREAT AND SMALL”

Vanessa Mendoza, Troy Brown, Jairo Ortega, Jose Cordero, Roberto Castellanos, Jerry Rodriguez, Shytiana Walker, Chantel Johnson, Luis Herrera, Jameel Bruner, Julio Duran, Kyndall Boyd, Valeria Araiza, Marycania Spaprudin, Lidia Acuna, Taylor Green, Eddie Gonzalez, Tashina Crittenden, and Wes Montgomery (teacher). 24th Street School, 2055 W. 24th St., Los Angeles, CA 90018.

Is there any animal life in our downtown LA neighborhood besides the obvious birds, rodents, stray domestic animals and insects? If we examine our neighborhood closely, will we find abundant animal life like we see at the LA ZOO?

We have been studying the animal kingdom in depth this year since many of us would like to pursue animal-related careers when we grow up. We feel that we are disadvantaged where we live because there are no areas where we could study animal life. We went to the L.A. Zoo in November and we learned all about mammals, reptiles, amphibians, birds, and fish. Most of us felt it was the best day we had ever had because we got to be around animals all day. Afterward, we did several projects on animals, we researched animals, and we checked out all of the books our school library offers on animal life. In January, we studied insects and camouflage and we wondered if there might be other animals in our environment that we didn't notice or see. We then decided to use the scientific method to see if we could discover if there were other animals in our environment. We stated our first hypotheses; half of us predicted that there was no other animal life beyond insects around us and half of us thought that there probably are some other small animals camouflaged or hidden outside our room. We hypothesized what living

things we might find if we dug up soil from points on the northern, southern, eastern, and western parts of our schoolyard and we predicted that we might find bugs, worms, lizards, ants, germs, fleas, snakes, cockroaches, and things too small to see.

We then divided into groups to collect data from for the northern, southern, eastern, and western parts of our playground. We collected dead leaves and loose soil on the top of the ground and put it in large tin cans. Our control group went to each site and tried to see if they could see anything in the soil or leaves before collection. We then returned to our room and looked in our cans. We tried to see and feel (using gloves) if anything was alive in our leaves and dirt, but we found only ants and spiders. The next day, we looked in our cans with magnifying glasses and microscopes, but we still didn't really see anything. We made a hypothesis that there were other things there; we just couldn't see them.

The next week, we went up to Mrs. Lui's fifth grade classroom. (They are working on a similar project). We took lots of the baby food jars that we had been collecting. In the baby food jars were plaster and charcoal so that we would have little habitats to keep animals we might find in, similar to the terrariums we made for our insects. In Mrs. Lui's room, we teamed up with her fifth graders and took our time using instruments to search for microscopic animals. We shined light on the leaves, and put them in funnels. The funnels went into large cans. Mrs. Lui's students helped us search through the soil and leaves. We did this a couple of times, and after several minutes we saw little animals under the magnifying glasses and microscopes. We learned these animals are called collembola and they are little animals too small to see with our eyes alone. We have been recording our methods and results in our individual scientific journals, and we drew pictures of these little tiny animals and described them. We thought that some looked like short, fat worms, some looked like clear white snails, and some looked like gooey snails without shells. We were surprised that there were many variations in colors and appearance. We hypothesized what conditions might be favorable for them to survive and reproduce.

From our research, we concluded that: the collembola like moist, shady areas with lots of leaves (since only soil from those types of environments yielded collembola); there are many little animals all around us that we can study to learn more about the animal kingdom, and you don't really need a lot of expensive, fancy lab equipment to study science. (We made most of it ourselves.) We would like to discover other types of animal life hidden in our environment, and in the future we will explore other methods to study animals. (Although we'd still love to go back to the LA Zoo some day!)

3043

EFFECTS OF A CLASSROOM-BASED PREJUDICE INTERVENTION CURRICULUM FACILITATED BY TRAINED COLLEGE STUDENTS ON THE HUMAN RELATIONS ATTITUDES OF HIGH SCHOOL STUDENTS. (S.T.O.P. "STUDENTS TAKE OUT PREJUDICE")

Gino Galvez, David Gibson, Arpi Proudian, and Dr. Michele Wittig (professor), California State University, Northridge, 18111 Nordhoff Street, Northridge, CA 91330 & Jessica Jackson, Arlin Pilavian, Maria Shishkina, and Allan Kakassy (teacher). Granada Hills High School, 10535 Zelzah Avenue, Granada Hills, CA 91344.

The purpose of the "S.T.O.P." program is to reduce attitudes of prejudice among high school students—and to stimulate their positive commitment/involvement within and outside the school to work to improve human relations. "S.T.O.P." recruits and trains college volunteers from C.S.U.N.'s Department of Psychology to act as facilitators of discussions. Once a week, over a period of seven weeks, these college students then lead an organized series of lessons on topics ranging from "racism" to "sexism" to "homophobia." The high school students are 9th graders enrolled in "Life Skills," a required course for graduation which focuses on goal setting, problem solving, and relationships. Weekly, the high school students participate in class discussion and maintain a written journal. Also, at the end of each period, the high school students complete a written evaluation rating the content of each lesson and the skillfulness of the presentation by their college facilitators. A recent enhancement this semester involves the recruitment of high school students who have been "S.T.O.P." program participants to receive special training in research to assist in conducting focus groups to evaluate the impact of the program. The current evaluation is based on a "pre" and "post" written survey, and also focus group oral feedback. The data indicates a generally positive impact on the attitudes of the high school students involved—but also seems to point to the need to further refine the evaluation process. Based on responses both from the high school students and the college facilitators, the "S.T.O.P." curriculum continues to be modified and improved.

3044

LEVELS OF VITAMIN C CONTENT

D.T. Le and G.C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This experiment was performed to compare the levels of vitamin C in juices and in fruit. First, I poured out six different juices and squeezed the juice out of the fruits. A boiled cornstarch and water combination was prepared and 10% iodine solution was added as well. Five milliliters of this mixture was used for every 10 drops of the different juices. I let it sit for a little bit so it could blend together, while I cleaned up. After a few days, I lined up the test tubes full of the new concoction from lightest to darkest against a white poster board, and recorded the data. I

made charts given the lightest color contained the most vitamin C content. The results of my experiment were surprising. My hypothesis was that the fruit would have more vitamin C, but my experiment proved me wrong. I learned that you can't just assume things; you have to try it and test it out and figure it out yourself. I wonder if it really just depended on where the fruit came from, and the brands/manufacturers of the juices that I used, but I guess I can do that experiment another time.

3045

EFFECTS OF SLOPE AND WATER ON SOIL DEPOSITION

Juan Guzman, Ivan Arzate, Ana Morales, Karla Siguenza, and Dr. Richard Gilbert (teacher). Valley Alternative High School, 14162 East Lomitas Ave., La Puente, CA 91746.

This experiment was developed for our participation in National Geology Week. This experiment observed the effects of slope and water on the erosion of soil. The experiment was conducted over several months with several erosion boards that were made with 1" grid lines on a white laminate bottom. The grid lines allowed for accurate mapping, detailing and accounting of the experimental effects. Slope was measured with the use of a compass and water was measured with the use of a graduated flask. The soil used was "Kiddies Fun Play Sand #1113" which is screened, filtered, dried and produced by Quickrite Products. A video was developed documenting the procedure and possible historical results. In all tests 11,000ml of dry soil was used. Secondly, at 40 degrees of slope the soil broke form without added water; therefore, tests were not performed past a slope of 30 degrees. Lying flat (0 degrees) the soil was able to absorb an average of 13,467mls of water before it broke form. Each test was performed 6 times with dry soil and the mean was then determined. Erosion is defined as the removal and transport of weathered material from one location to another. The addition of water was stopped when the soil broke original form. The amount of water used and the amount of soil movement was tabulated at 10, 20, 25 and 30 degrees of slope. At 10 degrees of slope the average amount of water needed was 10,034mls and soil displacement was an area of 72 squares (1"× 1" square). At 20 degrees of slope, an average of 8,105mls of water was needed for an average area of soil displacement equal to 40 squares. At 25 degrees of slope, an average of 7,993 mls of water was needed for an average area of soil displacement equal to 48 squares. At 30 degrees of slope, an average of 6,105mls of water was needed for an average area of soil displacement equal to 90 squares. These results did support our hypothesis that with an increase of slope, less water would be required for the soil to break form. When looking at the individual results of each test, an indeterminate result exists for support of our second hypothesis. Although the greater average area of soil displacement occurred at a greater degree of slope, there was a greater area average of soil displacement at 10 degrees then at either 20 or 25 degrees of slope; therefore, our hypothesis that slope is also a determinate of soil deposition is inconclusive. Slope does play a part in erosion; however, the amount of soil displacement does not depend solely on slope (except at a critical inclination). The shape of soil displacement is also indeterminate in that it does not follow a consistent shape. This experiment does lead to further questions concerning the interaction of the combined effects of slope and water on soil displacement. There may

also be properties in the soil that are inconsistent that prevent the soil from binding uniformly. This may result in the inconclusiveness of the effect of slope on soil displacement. Several tests were performed on different soil types, however, the soils did not absorb the water at greater degrees of slope and displacement in the form of runoffs (rills and gullies) occurred with a greatly reduced amount of water.

3046

EFFECTS OF DIFFERENT PHs OF LEMON JUICE ON APPLES

Anthony Bosnich and Mrs. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment examined whether a certain pH of lemon (*Citrus limon*) juice affected the preservation of apples (*Pyrus malus*) and preserved it the longest. Slices of apples were dipped into different pHs of lemon juice and then they were timed until they turned brown or rotten. I tested this experiment 3 times. The control, or plain apple, averaged 10 minutes. The apple soaked in lemon juice with a pH of 4, averaged 1 hour and 53 minutes. The apple soaked in lemon juice with a pH of 5, averaged 1 hour and 30 minutes. The apple soaked in lemon juice with a pH of 6, averaged 48 minutes. The apple soaked in lemon juice with a pH of 7, averaged 57 minutes. The results suggest that lemon juice with a pH of 4 preserves apples the longest.

3047

DOES TRACE ELEMENT COMPOSITION DETERMINE THE COLOR OF A CRYSTAL?

Lilit Pilossyan, Yelena Karapetyan, Hripsime Dishlaryan, and Kristin Fontilea (teacher). Grant High School, 13000 Oxnard Street, Valley Glen, CA 91401.

The purpose of this project was to determine the effect of trace element composition on the color of a crystal. Research was done in order to investigate previous literature, on how trace elements affect the color of a crystal. From this literature search the following hypotheses were devised. The presence of nickel results in a green crystal. The presence of cobalt results in a blue crystal. The presence of manganese results in a pink crystal. Nine double replacement reactions were mixed and precipitates/crystals were observed to determine if our predictions were valid. From the experiment we concluded that nickel does in fact result in a green crystal. However, cobalt and manganese did not necessarily result in the predicted colors. It is obvious that other factors contribute to the color of a crystal. Further research will be done to investigate the other factors.

3048

EFFECTS OF MILK AND WATER ON GREEN BEAN PLANT GROWTH

Eugene Shvarts and D. Shah (teacher). Portola Middle School, 18720 Yolanda Street, Tarzana, CA 91356.

This study examines the question, is milk or 7Up able to substitute for water in a green bean plant's diet? Each plant received 50mL of milk, 7Up or water (the control) daily, and the daily growth of each plant was recorded for two weeks. Four plants were given each type of nutrition. None of the four milk-fed plants showed any signs of growth, while one of the 7Up-fed sprouted a $\frac{1}{4}$ cm shoot. The control plants, the four fed with water, grew well, reaching heights of 8, $8\frac{1}{2}$, and 10 cm. Only one of the plants given water did not grow. The results suggest that the green bean plants grew best when fed by water, their regular form of nutrition.

3049

WILL CORROSION AFFECT ZINC MORE IN SEA OR FRESH WATER?

Ryker Crenshaw and D. Shah (teacher). Portola Middle School HGM, 18720 Linnet Street, Tarzana, CA 91356-3313.

This study looked for any difference between the amount of corrosion that affected metal in sea water in an amount of time and the amount of corrosion that affected zinc in fresh water in the same amount of time. 8 petri dishes were filled with either fresh water or sea water so that there were exactly four of each kind, and then one zinc nail was placed into each dish. Every day, a record was taken of the general amount of corrosion on each type of nail either in fresh or sea water. Each day a picture was also taken of all of the nails together. In seawater, corrosion began quickly and affected the nails more on the first days than the fresh water did. Corrosion began immediately in fresh water as well, but corroded slowly. Therefore, through the entire experiment fresh water's corrosion rate was much lower than sea water's. Around day 8 they both appeared to stop corroding for unknown reasons. The results suggested that electrochemical corrosion affected the nails in sea water and caused them to corrode very quickly, but the lack of such corrosive properties in fresh water caused those to corrode slower than the others.

3050

EFFECTS OF GIBBERELIC ACID ON LITTLE MARVEL DWARF PEA PLANT GROWTH

Jaime Aguirre, Edith Avalos, Daniella Williams (teacher), and Mary Corcoran Ph.D. (CSUN). North Hollywood High School, 5231 Colfax Avenue, North Hollywood, CA 91601.

This experiment was performed to determine the effect of gibberellic acid (GA), a plant growth stimulating hormone, on Little Marvel dwarf pea plants. We believed that the plants

treated with the lowest concentration of GA would have the greatest amount of growth. We used GA concentrations of 0 μg as the control, 0.005 μg of GA, 0.05 μg of GA, and 0.5 μg of GA. We assayed 80 pea plants for this experiment; 20-0 μg of GA, used as the control; 20-0.005 μg of GA; 20-0.05 μg of GA; and 20-0.5 μg of GA. The various concentrations of GA were applied using an automatic pipette calibrated to 0.01 ml. The plants were placed into a growth chamber with a temperature set to 20° Celsius. They were watered every other day. After 7 days, we measured each plant (in millimeters) to determine the amount of growth. We threw away four plants due to injury. The mean average of the plants that were treated with: 0 μg of GA, was 48.7 ± 15.6 ; 0.005 μg of GA, was 105 ± 21.5 ; 0.05 μg of GA, was 150 ± 22.7 ; and 0.5 μg of GA, was 182 ± 31.3 . After doing the experiment and collecting the data, we noticed that the higher the GA concentration, the greater the length of growth; therefore, our hypothesis was incorrect.

3051

WHAT SOAKS THE MOST WATER: PAPER TOWEL, SPONGE, OR TOWEL?

Elisa Choi and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question, "What soaks the most water: paper towel, sponge, or towel?" The paper towel was soaked with water and then was measured into the measuring cup. The paper towel soaked around 51 milliliters. Then the sponge was soaked. The sponge soaked around 110 milliliters. The towel soaked the most water out of the paper towel and sponge. The paper towel soaked the least amount of water.

3052

PH PAPER AND ITS EFFECTS ON ANTACIDS

Damon Dorman, Jennifer Claire Fox, Diana Lennox, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

The project tested the effects of three antacids on Hydrochloric acid (pH 2). The hypothesis was that Pepto-Bismol would work the fastest and have a stronger effect, compared to the results of Tums and Roloids. Using a mortar and pestle to grind, we ground each tablet according to the recommended dosage. Having tested the pH level of the Hydrochloric acid before and after adding the antacid, we can view the effect of the medicine on the pH level. The higher the pH, the more the acid had been neutralized. Allowing a time period of ten minutes for each test tube before checking the pH gave a more accurate reading. In conclusion, it was found that Pepto-Bismol worked the slowest, Tums worked the fastest, and Roloids neutralized the hydrochloric acid the best. Our hypothesis that Pepto-Bismol would work the best was not proven.

3053**WATER QUALITY STUDIES OF THE MALIBU WATERSHED II
(LATE WINTER–SPRING 2003)**

O. Archila, L. Avina, L. Casarez, J. Cruz, J. De Leon, L. Dorado, L. Gomez, G. Grover, C. Guiterrez, M. Higuera, L. Lopez, M. Lopez, W. Martinez, L. Molina, A. Podzharyy, J. Rivera, E. Rojo, R. Romero, J. Salgado, M. Samsonidze, A. Velazquez, G. Bethancourt, Pablo Cuellar, J. Bustamante, V. Mariscal, A. Figueroa, A. Agosto, S. Aguilar, H. Anguiano, E. Argueta, J. Becerra, S. Cabrera, C. Cienfuegos, C. Contreras, J. Cueva, L. Dermendjian, N. Garcia, A. Gonzalez, D. Goodwin, I. Hernandez, A. Herrera, S. Kharimian, K. Merlin, K. Olmedo, J. Pena, H. Perea, H. Rodriguez, L. Romero, A. Sandoval, A. Springstead, N. Stricklen, E. Vasquez, L. Velasquez, K. Lacey, J. Session, L. Banuelos, G. Sanchez, J. Sanchez, R. De Barge, E. Akram, J. Alfonso, C. Andrade, H. Arteaga, E. Baek, L. Backwell, V. Bustamante, V. Castro, M. Cordova, De La Torre, O. Garcia, L. Garza, Lailson, N. Martinez, M. Medina, M. Medrano, M. Molina, B. Navarro, K. Nunez, D. Pacheco, C. Paz, A. Rios, E. Roma, A. Silva, R. Taylor, J. Velazquez, V. Manuel, G. Marquez, H. Gordillo, H. Solorzano, C. Cervantes, F. Marroquin, F. Avila, L. Castillo, D. Contreras, J. Cruz, J.J. Sione, H. Gordon, P. Guardado, L. Hayrapetyan, M. Lopez, K. Mazariegos, M. Patterson, J. Placencia, H. Puma, A. Quintero, D. Robledo, J. Rodas, L. Rodriguez, E. Romero, J. Salazar, R. Saldivar, C. Sire, S. Smith, E. Thomas, B. Trejo, V. Trinidad, J. Valdivia, J. Vinueza, S. Yadidi, O. Morse, S. Gallegos, Jack Alder and Monica J. Tully (teacher). Mulholland Middle School, 17120 Vanowen St., Van Nuys, CA 91406.

The objective of this project is to allow middle school students, grades 6–8, to perform ongoing water quality studies on the Malibu watershed. Our present study investigates the water quality in three specific areas which make up the Malibu watershed: The Malibu Creek which drains into the Malibu Lagoon (a natural estuary), and the Malibu Beach area. The students and I performed chemical analyses on the water from these three areas in order to detect changes and levels of pollution and toxicity of this watershed system, from late winter (December) through early spring (March) 2003. In the course of this study, we observed on two different occasions the Malibu lagoon reestablishing itself physically after rupturing open during severe winter storms.

We compared our results to our previous studies and found that the water quality of the Malibu watershed is highly unstable at this time, due to severe winter storms. As the lagoon ruptures open, salt water rushes in and the lagoon becomes more like saltwater in nature. Fresh water draining from the lagoon mixes with the water at Malibu Beach and becomes more like fresh water in nature. The levels of chemical toxicity within the lagoon, including pH and nitrite concentration, decrease to their lowest levels. This occurs through the dilution and drainage of the water from the lagoon into the ocean at Malibu Beach. The levels of chemical toxicity in the water from Malibu Creek also decreased to their lowest levels, due to dilution by the higher volumes of water flowing through it, after the severe winter storms. Students were able to study the direct effects of winter storms on the water quality of the Malibu watershed.

3054

AGAROSE GEL ELECTROPHORESIS OF IL-6 mRNA IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Veena Sangkhae and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Boulevard, Woodland Hills, CA 91367.

The purpose is to isolate IL-6 Family of Cytokines mRNA in zebra fish developing stage mixed pool embryos. A complementary DNA analysis is used to identify patterns of messenger RNA expression at various developing stages of the embryo and to determine how closely related the messenger RNAs are to one another. The messenger RNA is isolated and transcribed to complementary DNA utilizing RT-PCR to amplify it exponentially. The polymerase chain reaction products are then analyzed by agarose gel electrophoresis. After the mRNA is successfully separated; the gels are stained with Ethidium Bromide (EtBr) or DNA stain. This allows the bands to be identified after they are exposed to polaroid film. The banding patterns from different IL-6 cDNA nucleotide sequence at various developing stage of the embryo are compared to establish the level of messenger RNA expression.

Results: Our study reveals that IL-6 Family of Cytokines is evident at various developing stages of the zebra fish embryo. The research data provided us with tissue specific facts about the IL-6 complementary DNA sequence. The data indicated a high degree of dissimilarity of IL-6 DNA nucleotide sequence up to three hours for developing stage of embryo when compared to mixed adult brain tissue of zebra fish. Also, a high degree of dissimilarity of IL-6 DNA nucleotide sequences are steadily increasing from six to twelve hours for developing stage embryo when compared to the mixed adult brain tissue of zebra fish. This evidence implies that embryo cytokines of IL-6 are markedly expressed very early in developing stages of the embryo. In fact, IL-6 complementary DNA gene products that bind the receptor protein of neural cells must play a necessary role for cell activity because the embryo cells are totipotent prior the gastrula stage of development. Therefore, an IL-6 gene product role is to cause a change in the cell activity rather than to perform a specific role and function.

3055

THE EFFECT OF COLORED LIGHTS ON PHOTOSYNTHESIS IN ELODEA

Victoria Chavez, Karla Carranza, and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Plants carry out photosynthesis in the presence of sunlight. Visible light is made up of seven colors. We were interested to find out whether any one color would promote photosynthesis as well as sunlight. We used elodea plant, green, blue and violet colored clear paper to test this out. We took four jars and put 3 stems of elodea and water in each of them. We wrapped the jars with

green, blue, violet or colorless clear paper with holes for aeration, and left them in the sunlight for 2–3 days. We added baking soda as a source of CO₂. The pH of the water was adjusted to around 7 with vinegar. As a measure of photosynthesis we counted the oxygen bubbles produced by the elodea plants, not by the presence of vinegar and baking soda. We found that in the presence of sunlight 230 bubbles/minute were produced. With violet color we counted 130 bubbles/minute. With green color it was 170 bubbles/minute and 110 bubbles/minute with blue color. Our results show that elodea can carry out photosynthesis in the presence of green, blue or violet colors. The rate of photosynthesis as measured by the production of oxygen is the highest in the presence of sunlight and the lowest with blue colored light.

3056

EFFECTS OF COLORED LENSES ON WHITE LIGHT REFRACTED BY A PRISM

Matthew Shulman and Mary Simonds (teacher). Portola HG Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined the question of whether white light passing through a colored lens before being refracted by a prism affects what colors are seen. A fifty-watt projection light was shone through a series of four different translucent colored lenses, and then into a plexiglass prism placed on a mirror. Each experiment was repeated five times. The control (white light from the projection bulb with no lenses) produced red, orange, yellow, green, blue, and violet light. The red lens resulted in only red and violet being visible. The blue lens produced green, blue, and violet light. The yellow lens produced orange, yellow, green, and violet light. The green lens produced orange, green, and blue light. In conclusion, white light produced all colors of the visible spectrum (red through violet). A colored lens placed between the light source and the prism impacted the colors that were visible after the light was refracted by the prism.

3057

EFFECTS OF COMMERCIAL FERTILIZER AND HOMEMADE COMPOST ON TOMATOES

C.B. Alagot and G.C. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This experiment examined possible variance between the effects of commercial fertilizer and homemade compost on tomato plants over a 50-day period. Tomato seeds were planted and, upon germination, four were selected for the experiment. Commercial fertilizer was added to two plants and homemade compost was added to the other two plants. The plants were given equal amounts of water every three days. Observations such as height and number of leaves were taken and recorded every five days. After the 50-day experiment, the data from each of the plants were compared. The results suggest minimal difference in the effects of commercial fertilizer and homemade compost on tomatoes.

3058

**EFFECTS OF SEVERAL COMMONLY USED CLEANERS
ON *RAPHANUS SATIVUS* SEEDS**

Anna Litvinchuk and M. Simonds (teacher). Portola Highly Gifted Middle School, 18720 Linnet Street, Tarzana, CA 91356.

Seeds, *Raphanus sativus*, were watered with window cleaner, Softsoap hand soap, and isopropyl rubbing alcohol solutions. Four sets with 3 cups were each watered once daily for 5 consecutive days with each cleaner containing 15ml tap water and 15ml cleaner forming a solution. Results show that by day 5, the most effective on the germination was the window cleaner followed by Softsoap hand soap, and last the isopropyl rubbing alcohol which destroyed the plant.

3059

**TEST OF WHETHER FISHING LINES REALLY HOLD THE AMOUNT
OF WEIGHT THAT THEIR LABEL STATES**

Ke'ale Louise and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examines the amount of weight fishing lines can hold when compared to the stated strength on the box. Three different brands and two different strengths were used during the experiment. A measured length of line was hung from the bottom of a spring scale. The loose end of the line was then tied to the handle of a bucket and was suspended in air over a tub. Gravel was then poured gradually into the hanging bucket until the line it was hanging from snapped. When the fishing line snapped, the total product that fell, gravel and bucket, was then collected and weighed. The total weight of the bucket would be the tested line's strength. The experiment would be repeated four times for each brand, strength, and length of line. In the end, the 2 lb (0.91 kg) Maxima brand fishing line proved itself the strongest because it held more than its labeled strength in about 40% of the tests.

3060

INTERNET POPULARITY BASED ON AGE GROUP

Isaac Bleaman and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined the interests shared between 20 different people of different age groups on the Internet. A website was built with a counter that counted each unique computer visitor. The visitors were asked to sign into a main page that would determine their age group. From there, the subjects had 7 categories of interest which they could choose from. The subjects

were asked to choose only the topic they would like to visit the most. The hyperlinks they could click on would bring them to a new page in the browser that counted the computer once more. Once the results were tallied, music proved to be the most popular for teens and pre-teens, movies and sports for adults, and games, sports, and music for children.

3061

WILL A PLANT IN SUNLIGHT GROW MORE THAN A PLANT IN DARKNESS?

Isela Garcia, Jennifer Hernandez, and Tim Rundall (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

Our hypothesis is that the plant in the sunlight will grow more because plants need light to live and grow. Our procedures were: first, we got two foam cups and cut them shorter. On the third cup we cut a hole on the top so that the flashlight would be able to fit there and give light to one plant. Second, we made three holes in the bottom of two cups. Third we put soil in two cups and then planted the seeds. Fourth, we cut out two small pieces of flashcard and wrote numbers one and two so that we knew which plant was which. Fifth, we watered the plans half an inch. Sixth, we put the flashlight on the hole of the third cup and put this cup on top of the second plant. Seventh, we put plant two under a bed in darkness. Eighth, we watered the plants half an inch of water everyday. Ninth, we recorded the growth of each plant, each Friday, for three weeks. Our results were that plant one, in the sunlight, grew half an inch every week and plant two didn't grow at all. Our conclusion is that the plant in the light grew more. Our experiment supports the idea that the plant in darkness wouldn't grow because plants need light to live and grow.

3062

EFFECTS OF CHANGING ANGLE OF ATTACK ON AIRFOILS

Bazyl Nettles and M. Simonds (teacher). Gaspar de Portola Highly Gifted Magnet, 18720 Linnet St., Tarzana, CA 91356.

This study examined how changing the angle of attack for an airfoil affects the amount of lift and drag created. Three different airfoils were tested at different angles into a wind of >80 kilometers per hour. These were placed in a scale wind tunnel, and the wind was provided from a woodworking shop dust collector. Each angle of attack was tested four times on each airfoil: a Lissaman L7769, a Liebeck L1003, and a flat piece of wood, "the barn door." The results suggest that an angle of 15° is good for a human-powered aircraft (Lissaman) and an angle of 10° is best for a commercial jet (Liebeck).

3063

DETERMINING IF THE VIDEO HEAD OF THE VCR USES AN ELECTROMAGNETIC SIGNAL TO TRANSFER INFORMATION FROM THE VHS TAPE TO THE VCR, WHICH IS THEN CARRIED TO THE TELEVISION MONITOR

Tim Donnelly, Andre Edwards, Arnold Juarez, Benjamin Juarez, and Ms. Wiedoef (teacher).
Chatsworth High School, 10027 Lurline Avenue, Chatsworth, CA 91311.

The purpose of this project was to determine how a VCR detects information from a VHS tape. We hypothesized that the video head of the VCR detects the signal from the VHS using electromagnets. To investigate our question, we opened up a VCR casing and examined the parts. We found that a small rod came up and pulled the tape towards the video head. The video head then started to spin in a clockwise direction. We did some research and found that the head rotates at 1,800 revolutions per minute (rpm), or 30 revolutions per second. After taking it apart we experimented on it by placing a VHS tape in a rewinder and putting a magnet next to it, when we tried to play the tape that previously had information on it, we found that the tape was completely blank. This led us to believe that the video head was no longer picking up a signal from the tape since the tape had been demagnetized. This also led us to the conclusion that the video head of a VCR uses an electromagnetic signal to transfer information from a VHS tape to the VCR, then on to the television monitor. We confirmed our findings with information we researched online.

We also completely disassembled, then reconstructed the VCR. After reconstruction, we left off the cover to see if the VCR would play a tape. We were surprised to find it did. After completing our experiments we were informed by our teacher that the VCR had not worked before we took it apart, so not only did we figure out how it worked, we fixed it!

3064

THE EFFECTS ON PLANTS OF RECEIVING WATER AND NO LIGHT AND LIGHT BUT NO WATER

Natchez Fowler and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment studied the question, do plants depend more on water or more on sunlight to grow. To test this, use 9 plants with a control of 3. For 3 plants give them only water, another 3, let them sit in the sun, and for the rest, give them both water and let them be in the sun. Each experiment was repeated 3 times. The results state that the plants that got only water grew better and faster than the plants that received only sunlight.

3065

TOTAL COMPLEMENTARY DNA EXPRESSION UTILIZING HIND III RFLPs FRAGMENTS GEL ELECTROPHORESIS IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Brittany Kim and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Boulevard, Woodland Hills, CA 91367.

The purpose is to analyze restriction fragment length polymorphism of total RNA in zebra fish developing stage mixed pool embryos. The RFLPs analysis is used to identify patterns of complementary DNA expression at various developing stages of the embryo and to determine how closely related the complementary RNA are to one another. The complementary DNA fragments (RFLPs) are separated by gel electrophoresis. We utilize a 0.8% agarose gels cast rather than the normal 1% agarose gels to increase the rate at which the cDNA fragments travel across the gel. After the RFLP fragments are successfully separated, the gels are stained with Ethidium Bromide (EtBr) or DNA stain. This procedure allows the bands to be identified after they are exposed to Polaroid film using an ultraviolet and white light transilluminator. The banding patterns from different IL-6 cDNA nucleotide sequence at various developing stages of the embryo are compared to establish the level of cDNA expression.

3066

STROOP EFFECT

M. McGrath and G.C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

In this experiment, the Stroop Effect was used to test a perceptual paradox. This is what happens when our eyes and brain are confronted with different information. There were three tests conducted with two subject groups, one female and one male, both balanced in age. In the first test, using the Stroop Effect, subjects were told to read the color of the word presented, i.e. the word red written in blue, should be read as blue. In the second test, the subjects were told to read the word as written, regardless of color, i.e. the word blue written in red should be read as blue. The third test, also used a perceptual paradox, but with numbers. In this particular test, subjects were asked to read the number of figures in the row, i.e. 1111 should be read as 4. A stopwatch was used to time the subjects, and the times were collected as data. The results showed that the females completed the tests in a shorter amount of time.

3067

HOW ICICLES FORM

Ranjani Sarode and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This experiment is based on the formation of icicles, the ice hangings on various areas due to the cold weather and temperature. Two cups are used over another cup for this experiment; the two cups used over the third are 210 ml and 150 ml. Each are punctured with different tools: the 210-ml has one pinhole in the center of the cup, and the second cup (150-ml) has three holes made from a pencil. The cup with the pinhole is covered with water (providing that the hole is covered with tape and the water is frozen. The cups are stacked on top of each other, turning opposite to the third cup. The results are the icicles that hang down from the cup on top. Cup A was below freezing point. This water is called subcooled water and will only form ice crystals if the freezing nuclei are present. As the water drips out of the cups, through the holes that were created, some of the molecules are left behind on the fibers of the paper towel. This provides a surface for the water to hold on, resulting in the ice crystals that are created.

3068

EFFECTS OF COMMERCIAL HAIRCOLOR ON ABSORBENCY OF HUMAN HAIR

Emily Law and M. Simonds (teacher). Gaspar de Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356-3313.

This investigation explored the possible link between commercial haircolor and the absorbency of human hair. Half of a 20-strand hair sample was dyed black and all hair was cut to a length of 9 centimeters. Both dyed and natural hair were allowed to soak in water overnight and the change in length, which is directly proportional to the amount of water absorbed, was recorded. Each experiment was repeated three times. The dyed hair expanded an average of .04 centimeters, while the natural hair lengthened an average of .042 centimeters. The results suggest that commercial hair dye inhibits the absorbance of moisture in human hair.

3069

THE EFFECTS OF UNHEALTHY CHEMICALS ON HUMAN BONES

Michelle Villegas and G.C Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This experiment shows the very harmful effects that everyday chemicals have on human bones. Chemicals that are in foods sometimes burn through the fragile tissues inside the human body. I took two chicken bones and put them in pool chemicals (acids). I left the two chicken bones in the chemicals for three days. At the end of the three days, I compared the four bones. I then saw that the bones that had been in the chemicals had almost completely disintegrated,

while the bones that were not in the chemicals were still in good shape. The chemical water had turned a brownish color and the bones had turned black and soft. In conclusion, I learned that chemicals that do not seem so harmful can and will gradually break away the bones in the human body. This experiment proves that people should watch the things they eat because it will disintegrate the bone.

3070

A MATHEMATICAL MODEL OF CASPASE ACTIVATION

Jordan Wengrod and Arthur Altshiller (teacher). Van Nuys High School, 6535 Cedros Ave., Van Nuys, CA 91411.

Caspases (proteases involved in processing IL-1 β and in apoptosis) are at the core of the cell's suicide machinery. These enzymes, once activated, dismantle the cell by selectively cleaving key proteins after forming aspartate residues. The events culminating in caspase activation are the subject of intense study because of their role in cancer and neurodegenerative and autoimmune disorders. A mechanistic mathematical model is presented, which describes key elements of receptor-mediated and stress-induced caspase activation. Mass-conservation principles in conjunction with kinetic rate laws were used to formulate ordinary differential equations that describe the temporal evolution of caspase activation. Qualitative strategies for the prevention of caspase activation are simulated and compared with experimental data, which shows that the model predictions are consistent with the available information. Thus, the model could aid in better understanding caspase activation and in identifying therapeutic approaches promoting or retarding apoptotic cell death.

A list of the equations used to model Caspase Activation are listed below:

PROGRAMMED CELL DEATH AND ITS RELATIONSHIP TO NEURODEGENERATIVE AUTOIMMUNE DISORDERS

MATHEMATICAL MODEL OF APOPTOSIS

NOTATION

x_0 = scaled population
 x_1 = mRNA transcribed from OL
 x_2 = mRNA transcribed from OR
 x_3 = protein LuxR
 x_4 = protein LuxI
 x_5 = protein LuxA/B
 x_6 = protein LuxC/D/E
 x_7 = autoinducer A_i
 x_8 = complex C_0

EVOLUTION EQUATIONS . . .

$\frac{dx_0}{dt} = k_G x_0$
 $\frac{dx_1}{dt} = T_c[Y(x_8, k_{C_0}, n_{C_0}) F(c_{CRP}, k_{CRP}, n_{CRP}) + b]$

$$\begin{aligned}
 & -x_1/HRNA -kG x_1 \\
 dx_2/dt &= Tc[F(x_8, kC_0, nC_0) Y(cCRP, kCRP, nCRP)+b] \\
 & -x_2/HRNA -kG x_2 \\
 dx_3/dt &= TI x_1 -x_3/Hsp-rAiRx_7 x_3 -rC_0x_8 -kG x_3 \\
 dx_4/dt &= TI x_2 -x_4iHsp-kG x_4 \\
 dx_5/dt &= TI x_2 -x_5/Hsp-kG x_5 \\
 dx_6/dt &= TI x_2 -x_6/Hsp-kG x_6 \\
 dx_7/dt &= x_0(rAll x_4 -rAiRx_7 x_3+rC_0x_8) -x_7/HAi \\
 dx_8/dt &= rAiR x_7 x_3 -x_8/Hsp -rC_0x_8-kGx_8
 \end{aligned}$$

I used references #2, 4, 5, 7 to compare the model. The model is my own creation.

3071

EFFECTS OF HEAT AND HYDRATION ON TENSILE PROPERTIES OF HUMAN HAIR FIBERS

Kacey Marton and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the effect of hydration and heat on the tensile properties of human hair fibers. A device was built to precisely apply a stress to a hair fiber and measure the resulting strain. This stress/strain assessing mechanism (SSAM) uses an ideal spring that follows Hooke's law perfectly. Several 8–12 inch strands of hair were obtained from the head of six different persons. Both ends of each hair were threaded into the eye of a needle, tied, then glued with epoxy. Using the SSAM, the tensile properties were studied on 32 single hair fibers from three people. These included: Young's modulus before the yield point, stress and strain at the yield point, the modulus after the yield point, the final modulus before the breaking point, and the final stress and strain at the break point. The effects of heat were studied using 15 strands of hair from 3 people. Each strand was cut into two pieces of equal length. One piece from each set was placed in an oven at 95–100°C for 2–3 hours, while the pairs to this set were kept at room temperature. The heat-treated fibers became stiffer (less elastic) over a longer range of stresses. In many cases, the modulus after the yield point was nearly eliminated. The effects of hydration were similarly studied using 21 paired pieces of hair from 3 sources. One set was soaked in 40–45°C water for 2–3 hours, while the other 21 pieces were kept dry and at room temperature. The water-treated fibers showed an increase in elasticity and tended to yield with less stress.

3072

RT-PCR OF TOTAL RNA IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Michelle Diep and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Blvd., Woodland Hills, CA 91367.

The purpose is to utilize PCR to amplify total RNA in zebra fish. The chemistry of PCR depends on the complementarities of the DNA bases. When one molecule of DNA is sufficiently heated, the hydrogen bonds holding together the double helix are disrupted and the molecule denatures into single strands instead of a double strand. Complementary base pairs can reanneal and the double helix can be restored if the DNA solution is allowed to cool. In performing a PCR reaction, a small amount of the target DNA is added to a test tube that contains a buffered solution of DNA polymerase, oligonucleotide primers, four deoxynucleotide building blocks of DNA, and the cofactor MgCl₂. The PCR mixture is then taken through replication cycles in a Gene Cyclor Thermal Cyclor.

The embryos are collected and frozen for extraction. At least 100 embryos are used for investigation. The embryo's total RNAs are prepared from a pool of mixed embryos. Total RNAs are extracted by the method of Chromczynski and Sacchi (1987) and modified for fish tissues (Gong et al, 1992). Complementary DNA synthesis is carried out using an oligo dT primer. The PCR products are analyzed by agarose gel electrophoresis using 100-bp DNA ladder as molecular weight markers.

To perform the polymerase chain reaction, a series of steps are used. Our research team selected the QIAGEN RT-PCR to transcribe total RNA to complementary DNA. In addition, a PCR Kit donated by AMGEN Biotechnology Corporation is also used for the PCR procedure. The Kit's components consist of three AMGEN Corporation's PCR products: Master Mix I, Master Mix II, and Taq polymerase. The enzyme and reagents along with the isolated total RNA are the key components in the PCR process. A Bio Rad Gene Cyclor Thermal Cyclor Version 1.5, 100/120V is used in the PCR process. The cyclor is manually programmed with the necessary steps and cycles in order to obtain results. The PCR is carried out for 30 cycles of 94 degrees Celsius where the DNA is annealed into single strands. One minute at 58 degrees Celsius where the primers hybridize to their complementary sequences on either side of the target sequence. One minute at 72 degrees Celsius where the polymerase binds and extends a complementary DNA strand from each primer.

PCR has been proven to be a quick, reliable method for usage of many different areas of science including detection of mutations that associate with genetic disease. It has allowed scientists to make billions of copies of DNA without using cloning. It has proved beneficial in our NSF/Eisenhower research. I've learned so much. I'm grateful to have attained this wonderful experience.

3073

THE STAINING LEVEL OF COFFEE ON TEETH

Daniel Cho and Mrs. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment was to find out which coffee that the experimenter used would stain the most. The coffees used were Café Moula, Golden Roasted, Café en Grains (spiced), 100% Kauai Black Coffee, and Hazelnut French Roast. Out of the five Café Moula seemed to stain teeth the most (egg shells), and the 100% Kauai Black Coffee seemed to stain the least. Each experiment was repeated three times. Each egg shell was placed in the coffee for two hours and dried to see how badly or little it had been stained. The experiment turned out to be success. The experiment also told me what kind of coffees were actually not good for my health and which ones were actually good for my health. In conclusion the Café Moula stained the most, the Golden Roasted stained the second most, the Hazelnut French Roast stained the medium of the experiment, the Café en Grains stained the second least, and the 100% Kauai Black Coffee stained the least.

3074

WHICH CAN CLEAN A CHOCOLATE ICE-CREAM STAIN THE BEST: COCA-COLA, ORANGE JUICE, OR TEA?

Jillian Cohn and D. Shah (teacher). Gasper de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of a specific material that could possibly clean a chocolate ice-cream stain better than a detergent. Each piece of cloth was stained and then soaked in 4 cups of water and two tablespoons of the tested material assigned to them. The variable was the different substances that the cloth soaked in, which were Coca-Cola, orange juice, tea, and detergent, the control. There was also one cloth that hadn't been soaked at all, but had been stained, which also acted as a control. Each experiment was repeated 4 times. On average, the coca-cola cleaned the stain the best, while the tea was next, and the orange juice in third, all with slight intervals. Ironically, the control, detergent, was worst by far. The experiment also implies that the first test produced the cleanest cloths, while the third test resulted in the dirtiest, although they were not far off. The result suggests that even though the shirts were a little colored after being soaked in these solutions, the stain still washed off best after soaking in the Coca-Cola.

3075

HOW DOES MUNG BEANS' GROWTH CHANGE DUE TO THE EFFECTS OF VARIOUS LIQUIDS?

Thach Diep and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This experiment analyzes how various types of liquid would affect the growth of mung bean plants—in the aspects of healthiest, tallest, and the best soil condition. The mung beans are divided into five, separate cups (three apiece) that contained one of the various liquids: salt water, jasmine tea, Coca-Cola, liquefied sugars, and tap water. Each cup received daily watering of an equal amount—averaging 1 teaspoon per day. In the end, water was the healthiest in both soil condition and plant development. Since tap water is pure from most chemicals, it has little effect in the natural process of photosynthesis. Jasmine tea was the fastest grower because tea contained caffeine, a stimulant, which increases the process of photosynthesis. Liquefied sugars are made up of mainly sucrose, a form of sugar, which supplied the mung beans with an abundant amount of sugar. Thus, the overflow of nutrient threw the photosynthesis process out of balance. Salt possessed sodium, which dehydrated the plant to a point where the beans shriveled into half their original size. In Coca-Cola (having phosphorus acids), the mung beans ended up being decayed and rotted away.

3076

DOES PRICE MATTER ON HOW LONG A BATTERY LASTS?

Sang Hwang and M. Simonds (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This study examined whether the price of a battery would affect how much energy and how long a battery lasted. The five types of batteries, Energizer, Albertson's, Duracell, Eveready, and Rayovac, were tested in a flashlight to see which one lasted longer. Most of them were left on overnight and later the data was recorded. The results were the Energizer lasted 24 hours and 12 minutes, the Albertson's lasted 12 hours and 3 minutes, the Duracell lasted 15 hours and 1 min, the Eveready lasted 6 hours and 33 minutes, and the Rayovac lasted 24 hours and 13 minutes. Rayovac, which wasn't the most expensive, lasted the longest by about 2 hours.

3077

**PHENOTYPIC EXPRESSION AS A FUNCTION OF DIFFERENTIAL SUBSTRATE
IN *BRASSICA RAPA***

S. Gevoglanyan and D.M. McDonnell (teacher). Sherman Oaks Center for Enriched Studies, 18605 Erwin St., Sherman Oaks, CA 91335.

The purpose of this study is to determine if there is a correlation between the substrate type that *Brassica rapa* is sowed into and any phenotypic expression. *Brassica rapa* are small mustard-like plants in the crucifer family. These petite plants cycle rapidly, (~ 40 days), through their entire life cycle allowing pollination and seed harvesting many times in one academic year. Three different substrates were identified for their ubiquitous nature. Perlite, potting soil, and a mixture 1:1 of common clay soil and Perlite were sowed with 36 seeds of wild type *Brassica rapa*. The potting soil showed the best germination rate, 100% after 3 days. The clay mix and the Perlite showed a retarded rate of germination over a period of 3–5 days. While the Perlite sample eventually reached 100% germination, the clay mixture peaked at 60% germination. During the vegetative growth stage (prior to development of reproductive structures) a striking phenotypic difference was observed. The internodal distance was reduced in Perlite, while very stunted in the clay mixture. This difference may be due to a lack of hormonal expression as a result of nutrient deficiency. The clay mixture and Perlite also showed signs of chlorosis though this observation was much more pronounced in the clay mixture. Continuing experiments will determine if there are other soils or soil mixtures that provide a more successful substrate than the potting soil.

3078

**DISTILLED WATER IS THE BEST ENVIRONMENT FOR CONCAVALIN A
TO BIND TO YEAST CELLS**

A. Avenisyan, R. Ayon, A. Beltran, J. Cruz, A. De La Cruz, J. Dinh, J. Foust, C. Gramajo, E. Gutierrez, K. Hendifar, K. Hughes, T. Jones, A. Kelley, B. Knight, S. Lindsay, M. Santizo, S. Marroquin, R. Mendoza, N. Moreno, S. Morente, W. Morris, B. Moz, A. Rahimi, R. Ramirez, C. Rosales, and Urenia Astrid Hernandez (teacher). Mulholland Middle School, 17120 Vanowen St., Van Nuys, CA 91406.

In this experiment, we tested the ability of Concanavalin A to bind to yeast cells in distilled, salt, and tap water. Concanavalin A (Con A) is a large protein that binds to the non-reducing sugars D-glucose and D-mannose present on the cell membrane of the yeast cells. We hypothesized as a class, that distilled water would be the best environment for Con A and yeast to react because there wouldn't be any ions interfering with the collisions between the Con A and yeast cells in distilled water. The procedure involved placing two drops of distilled water on one side of the slide and two drops of either tap or salt water on the other side and then adding Con A and yeast cells. Then, the students observed the Con A beads with yeasts attached to them first at 4x and

then at 10x. The experiment was repeated three times for each of the three environments. It was found that more yeasts were bound to Con A in distilled and tap water than in sea water. Our results were consistent with our hypothesis as distilled water proved to be the best environment for Con A beads to bind to yeast cells. This experiment enhanced the students' understanding of the interactions of cells with chemicals in their surroundings by means of surface molecules present on the cell membrane.

3079

DO PIGEONS SHOW PREFERENCE BETWEEN DIFFERENT TYPES OF BREAD?

Josh Rubin and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

My study examined the question of whether or not pigeons showed preference between different types of bread. The study consisted of three variables: plain bread, buttered bread and burnt bread. Three piles (each consisting of seven of one type of bread) were put in front of a group of pigeons. A timer was started at thirty minutes, and the time was written down when each pile was completely eaten. The experiment was repeated ten times. The results of my experiments were as follows: pigeons immediately finished the plain bread. After 3–7 minutes all the plain bread was gone. After 6–10 minutes, all the buttered bread had been eaten. There was always $\frac{1}{3}$ to all the burnt bread remaining after the thirty minutes was up. These results suggest that of the three types of bread tested, pigeons prefer plain bread the most, then buttered, and burnt the least.

3080

EFFECTS OF THE LOSS OF CALCIUM ON BONE STRENGTH

Julie Prado and Mr. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This study examined the effect of the loss of calcium on bone strength. Six chicken bones were placed in separate jars. The jars were filled with vinegar, an acid, which dissolves the calcium in bones. Three jars were set aside. They had vinegar and bones only. The remaining jars contained different amounts of calcium tablets. They were left alone for 4 days. The results suggest that the more the calcium the stronger the bone will be. The bones with calcium were strong and unable to bend. The bones without calcium on the other hand, were flexible and in bad condition.

3081

ASTHMA AND POLLUTION?

Teresa Callahan and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Rd, Alhambra, CA 91803.

The purpose of this report is to state if there is some sort of correlation between the amounts of various pollutants in the air and the admittance of asthma patients into the hospital. Some questions that were asked in this experiment were: Do pollutants peak and fall at the same rates of the symptoms of asthma patients and their admittance into the hospital or is there simply no relation between the numbers? The specific airborne pollutants that were chosen to be studied were particulate matter, sulfate, nitrate, and chloride. I did this by comparing air quality records obtained from Southern California Air Quality Management Department and asthma patient hospital admittance records from Huntington Memorial Hospital, in various charts. The charts were analyzed and cross-referenced in order to spot any possible trends in the numbers. No specific trends were noted. It is my recommendation that in the future, should someone attempt to determine if there is a correlation between pollutants and asthma patients, that they obtain more detailed records in order to do further cross-referencing, therefore being able to get more precise results.

3082

WILL OUR MEALWORMS SPEND MORE TIME NEAR GREEN GRAPES OR RED GRAPES?

Joseph Ferrero, Giovanni Fiorani, Jasmine Grimes, Jason Gutierrez, Gabriela Jacobson, Christina Reynoso, Jason Strong, Arun Suresh, Maureen Tee, Danne Villalobos, and C. F. Hajdu (teacher). Joaquin Miller High School, 8218 Vanalden Avenue, Reseda, CA 91335.

The purpose of this experiment was to see if our mealworms (*Tenibrio molitor*) would show a preference to green seedless grapes or red seedless grapes. Before we did our experiment we guessed (made hypotheses) as to which grape the mealworms would like better. We all guessed that the mealworms would prefer and be attracted to the green grape. To test our hypothesis we drew a black line with a Sharpie® marker to divide three small (8 oz.) margarine tubs into two halves. Into one half of each margarine tub we placed a green grape that had been sliced into a one-fourth piece. Into the other half of each margarine tub we place a red grape that had been sliced into a one-fourth piece. Then we placed 5 mealworms into each of the three margarine tubs. For the following 24 hours we recorded the number of mealworms on the green grape half of each margarine tub and the number of mealworms on the red grape half of each margarine tub 6 times. The number of mealworms on the green grape side ranged from 2–5 in tub #1, 1–2 in tub #2, and 1–4 in tub #3. The number of mealworms on the red grape side ranged from 0–3 in tub #1, 3–4 in tub #2, and 1–4 in tub #3. The average number of mealworms on the green grape side of each tub was as follows: tub #1 = 3.17, tub #2 = 1.67, tub #3 = 2.67. The average number

of mealworms on the red grape side of each tub was: tub #1 = 1.83, tub #2 = 3.33, tub #3 = 2.33. From these numbers it was hard to know if the mealworms had spent more time near the green grapes or the red grapes. However, when we calculated the total average it was easier to compare numbers and understand what had happened. The total average of mealworms on the green grape side was $7.51 / 3 = 2.50$. The total average of mealworms on the red grape side was $7.49 / 3 = 2.50$. The total averages were the same for the number of mealworms on the green grape side and the number of mealworms on the red grape side. Our data strongly suggests that the mealworms showed no preference to the green grapes or the red grapes. Therefore our experimental results did not support our hypothesis that the mealworms would show a preference to the green grapes by spending more time near the green grapes. The mealworms spent an equal amount of time near the green grapes and the red grapes.

3083

EFFECT OF LIGHT INTENSITY ON THE EATING HABITS OF KOI AND BETA FISH

Kiona Tanghal and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examined how the eating habits of koi and beta fish were affected when they were moved to a constantly lit environment. Two groups of three fish were used to determine this. The first group was placed in a tank of freshwater in natural light. The second group was placed in an enclosed space next to a 1.5 watt bulb for the duration of a seven-day week. Both groups were monitored to see when they reacted to the presence of food. Time in between feedings and the number of pellets eaten were recorded each day during the experiment. The result suggested that fish subjected to constant illumination consume considerably less than fish in natural light.

3084

THE BACTERIA FOUND IN WATER

A.W. Ostovich and G.C. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This study showed the amount of bacteria found in different samples of water. I collected six samples of water from various sources. These included toilet water, water from Lake Balboa, drinking fountain water, home tap water, refrigerator door dispenser water, and a commercial water bottle. The samples were cultured, colony counts performed, and gram stains were done in order to see the different types of bacteria in each sample. It took me four days to complete this experiment in a medical laboratory within St. John's Health Center. I found that the lake water had the most bacteria. The water bottle had no bacteria. The toilet water had fewer bacteria than expected. The other samples of water had about the same amounts of bacteria. My orig-

inal hypothesis was proven to be incorrect. My assumption was that the toilet water would have the greatest number of bacteria, while the refrigerator dispenser would have few bacteria. The toilet water grew out few bacteria which may be due to the constant flushing of the toilet with chlorinated water along with cleaning products used. The refrigerator door may have grown more bacteria because the spout may have bacteria that collects around the opening. The other sources of water were as expected, with lake water containing many bacteria and drinking water containing little or none.

3085

EFFECTS OF PLANT FOOD ON MORNING GLORY GROWTH

Billy Shin and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment tested if the use of plant food stimulates the growth of the Morning Glory plant. Three seeds were planted into 10 pots. Five pots were watered with normal water, and the others with Miracle-Gro dissolved in water. The plants were watered daily with a quarter cup of water. Pictures were taken weekly. In the end, the results were that the normally watered Morning Glory plants grew healthier and longer.

3086

WHAT IS THE EFFICIENCY OF MAGNETIC LEVITATION?

Philipp Bonushkin and M. Simonds (teacher). Portola HG Magnet, 18720 Linnet St, Tarzana, CA 91356.

This test examined whether magnetic semi-levitation was more effective than no levitation. Semi-levitation is the process of levitating an object with support from the sides, so there is still friction. Two objects of equal weight, one magnetically levitated and the other with simple wheels, were launched at six different angles of depression. These experiments were repeated 10 different times, and the average of the speed recorded. The magnetically levitated object was $4.83 \text{ cm/s} \pm .82 \text{ cm/s}$ faster than the object with wheels. Therefore, magnetic levitation is an effective way of movement and/or transportation.

3087

EFFECT OF COLOR ON A HUMMINGBIRD'S CHOICE OF FOOD

Sarah Cannon, and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356-3313.

This science fair project determined which color the hummingbirds that live in North Hollywood prefer to eat/drink the most. There were six hummingbird feeders hung in a row, which offered six different colors of sugar-water. Since all six feeders were displayed next to each other,

the factors of sun, wind, evaporation, and temperature could be ignored. This project demonstrated that the red sugar-water was the one that the hummingbirds liked the most, followed closely by blue, but far ahead of yellow, clear, purple, and green. In conclusion, the most popular color that the birds like was the red, so when one wants to attract hummingbirds, get a hummingbird feeder, and fill it with sugar-water, dyed red . . . but only if that area has hummingbirds.

3088

THE STUDY OF PENDULUM PROPERTIES AND THE DETERMINATION OF EARTH'S GRAVITY ACCELERATION

Katherine Lee and D. Shah (teacher). Gaspar de Portola HGM Middle School, 18720 Linnet Street, Tarzana, CA 91356.

The behavior of the pendulum was studied. The actual pendulum was constructed with different weights and strings and a metal frame. The number of swings was counted for 15 seconds and the period was obtained by dividing the 15 seconds by the number of swings. It was discovered that the period increased as the length of the pendulum's string increased. It was also found that the release distance and the weight of the bob had very little or no effect on the period of the pendulum. Furthermore, the earth's gravity acceleration was measured to be 9.78 m/sec^2 , which was quite close to the known value of 9.8 m/sec^2 .

3089

WHICH AGENT PREVENTS A SLICED APPLE FROM BROWNING?

Max Genchel and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356-3313.

This study examined the question of which agent, sugar, salt or lemon juice, when spread on the exposed part of a sliced apple, would prevent the exposed surface from browning. Two red, Washington apples were sliced into eight equal pieces each. The exposed surface of four slices was spread with salt, four with sugar, four with lemon juice, and no agent was applied to the remaining four slices because they were designated as the control group. After six hours, the slices were observed. The control group showed normal browning of the exposed apple slice faces, as expected. The salt did nothing to prevent the browning process of the apples. The sugar appeared to increase the speed of the browning process on the exposed surfaces to which sugar had been applied. However, the lemon juice almost completely stopped the browning process on the surfaces of the apple slices to which it had been applied. The results suggest that the chemicals in the apples that rust when exposed to oxygen can be inhibited by applying lemon juice to the apples.

3090

CAN VITAMIN C STOP THE OXIDATION OF BANANA SLICES?

Jose Chinchilla and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Vitamin C or ascorbic acid is known to be an antioxidant. When a peeled banana is left outside it turns brown. We wanted to find out whether an antioxidant like vitamin C could prevent the browning of banana. In order to test this we sliced banana into eight pieces. We put 4 pieces of banana in one saucer and put the other 4 pieces of banana on another saucer. We crushed a vitamin C tablet and sprinkled it on the banana pieces on one of the two saucers. We recorded the changes in the banana every 15 minutes over a period of two hours. We observed that the banana pieces without vitamin C turned brown in 30 minutes whereas the vitamin C treated pieces did not change color over the experimental period. Our results show that vitamin C can prevent the browning of banana.

3091

IS SUNSCREEN SUN PROTECTION FACTOR 15 AS EFFECTIVE AS SUNSCREEN PROTECTION FACTORS 23, 30, 50?

Tess Lerner-Byars and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined whether sunscreen with sun protection factor (SPF) 15 worked as well, if not better, than sunscreens with SPFs 23, 30, and 50. Each were placed on a separate corner of a sheet of Sunprint Kit paper on four different sheets and placed in direct sunlight for intervals of 30 minutes (30 minutes, 1 hour, 1 hour and 30 minutes, and 2 hours). After each interval one sheet of Sunprint Kit paper was brought inside and the sunscreen was removed from the sheets. After 15 minutes, the sunscreen that kept the paper the whitest, second whitest, etc. was recorded. Each experiment was repeated three times. Banana Boat sunscreen with SPF 50 was the best protector of the paper followed by SPF 23, SPF 15, and SPF 30. The results prove that Banana Boat sunscreen with SPF 50 is the best protector of skin from sunburns.

3092

EFFECTS OF MIRACLE-GRO ON STRAWBERRY AND ALYSSUM PLANT GROWTH

Jana La Brasca and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study observed the effects of a root and leaf growth stimulator, Miracle-Gro, on two breeds of plants: Sequoia Strawberries and Wonderland Deep Roses. Thirty-six plants were

3097

C-FERN: BABY RACE

Catherine Dy and Aulikki Flagan (teacher). Ramona Convent Secondary School, 701 West Ramona Road, Alhambra, CA 91803.

In my project, I determined how much distance it takes between a male and hermaphrodite C-Fern to reproduce and if the amount of distance affects the time for fertilization. I have grown numerous spores and have separated four pairs of spores with various distances between them. It took me no more than two weeks for the spores to reproduce because of the rapid growth of the spores. Both types of spores grow roots that can find each other so it did not take long for the spores to find each other. In conclusion, the distance of the spores did not affect the time it took for reproduction.

3098

FLAME TEST

R. De Alba, C. Israel, M. Miranda, J. Rodriguez, E. Yaidi, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

The purpose of this experiment was to determine the relationship between how metallic a metal is compared to the color it would turn a flame. We placed a small quantity of Nickel Nitrate, Zinc Nitrate, Cupric Nitrate, Ferric Nitrate, Sodium Nitrate, Cobalt Nitrate and Potassium Nitrate into separate containers. We dipped the copper wire into one of the metallic salts, then we placed the copper wire into the middle of the flame and awaited the reaction. After each test, we cleaned the copper wire with Hydrochloric Acid (6 Molar). We tested each metallic salt once and the results were that Nickel Nitrate produced a green color, Zinc Nitrate and Cupric Nitrate produced a blue color, Ferric Nitrate produced a gold color, Sodium Nitrate and Cobalt Nitrate both produced an orange color and Potassium Nitrate produced a hot-pink color under the flame. The results suggest that the metallic salts such as Nickel Nitrate, Zinc Nitrate and Cupric Nitrate, the less metallic elements, turn blue or green. Ferric Nitrate, Cobalt Nitrate, Sodium Nitrate and Potassium Nitrate, the more metallic elements, produced an orange, gold or hot-pink color. We concluded that the range of color is determined by the metallic nature of the salt.

3099

EFFECTS OF CUP MATERIAL ON WATER TEMPERATURE

Anrey Wang and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examined the question of cup material on water temperature. Water was poured in plastic cups and Styrofoam cups. Ice was added and the temperature of both cups of water

was recorded, then recorded again 5 minutes later, 10 minutes later, 15 minutes later, and 20 minutes later. This experiment was repeated 2 times. Water in plastic cups was initially 23°C, after 5 minutes: 17°C(+½°), after 10 minutes: 16°C(±½°), after 15 minutes: 16°C(+½°), and after 20 minutes: 17°C(-½°). Water in Styrofoam cups was initially 23°C, after 5 minutes: 18°C, after 10 minutes: 18°C, after 15 minutes: 18°C(+½°), and after 20 minutes: 18°C(+½°). These results suggest that plastic cups keep water cooler than Styrofoam cups by 1–2 degrees Celsius.

3100

HOW DIET AFFECTS THINKING

Joyce Truong and G. C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

The purpose of this experiment was to discover whether or not diet affects thinking, and if it does, what type of effect it has. I hypothesized that the fastest times would belong to the carbohydrate group, followed by the protein group and the fat group. To do this, I used eight female mice and put them on a specific diet, such as carbohydrates, fats, and proteins. They were tested in maze and had their times recorded. These times were then compared to the times recorded when they ran the maze on a balanced diet, to find the percent of increase or decrease. According to my experiment, diet does indeed affect thinking. I concluded that carbohydrates and proteins increase the thinking process, carbohydrates having the more positive effect. Carbohydrates increased the thinking process most likely due to the ability of carbohydrates to produce neurotransmitters into the brain and because of the energy carbohydrates supply. I also discovered that fats decreased the thinking process and memory, due to lack of proper nutrition making thinking slower and more difficult for those on a fat dominated diet.

3101

PRACTICAL POWER OF WIND ENERGY

Armen Sharibans, Alex Pezeshkian, and Yolanda Ohanesyan (teacher). A.G.B.U. Demirdjian High School, 6844 Oakdale Avenue, Canoga Park, CA 91306.

The intention of this project was to quantify the maximum weight that could be elevated by a constant gust of wind energy. We hypothesized that a steadily applied amount of wind energy, which we quantified at 4.5 m/s, put into a machine with a standard wind-surface area of 1084 cm², would respectively enable the amplification of a proportional weight of at least 500 grams upwards. The applications of this, however, would be to proportionalize our findings into larger scale, practical results. To analyze our hypothesis and investigate the principles of wind energy, we produced a simple machine. To one end of the apparatus was the weight under consideration, while the other terminus held varying parachutes (therefore varying areas) to which the steady amount of wind energy was applied. The device and its two termini were joined by three pulleys. After applying 4.5 m/s amount of wind force to lift each respective

weight with each specific parachute, we plotted both the weight of the object and the amount of wind force needed to lift it 6 cm on the x- and y-axes, respectively. In conclusion, to lift the object, our graphs exhibited an increasing proportion (and need) of 1.8% of surface area per gram of the object. Our hypothesis was correct to a simplified extent; wind energy could be utilized to effectively lift, carry, and situate objects without the use of hydraulic lifts or fossil fuels. Of course, for practical industrial applications, proportions of weight and their needed energy amounts would have to increase significantly.

3102

EFFECT OF FOAM CORE FINS ON DELTA KITE FLIGHT

Mimi Alves and D. Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the possible effect of the attachment of parallelogram shaped foam core fins, 14 cm. × 9 cm. × 25 cm., to a delta kite with a 12 dec. wingspan. Repeated flight trials of the control kite and the “finned” kite showed that the “finned” kite was incapable of flight, as well as the hypothesized result, rotating in a horizontal manner. The fins were then cut in half horizontally and replaced. The “altered finned” kite had a variety of flight patterns. Neither “finned” delta kites flew as predicted or as well as the control kite.

3103

EFFECTS OF WET COTTON BALLS, COMPOST, AND ORDINARY TOPSOIL ON GRASS SEED GERMINATION

Cintia Huitzil and M. Simonds (teacher). Gaspar de Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356-3313.

This experiment tested and compared the growth rate of *St. Augustine* grass seeds planted in wet cotton balls, compost, and ordinary topsoil and determined which of the substances caused the seeds to germinate faster. *St. Augustine* grass seeds were planted in aluminum trays containing pure topsoil, compost, and wet cotton balls. All trays were watered with 64 oz. of water daily; each experiment was conducted three times. No seeds germinated in wet cotton balls. However, the germination of the seeds planted in topsoil ranged from 4 to 6 centimeters by the second month. The germination of the seeds planted in compost ranged only from 1 to almost 2 centimeters. The results proved that topsoil is the best way, out of the three tested, to germinate *S. Augustine* grass.

3104

BACTERIAL GROWTH IN MILK SAMPLES

Jake Oldach and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment studied the growth of bacterial cultures in different types of milk. Samples were placed in jars and then at room temperature (23.9°C), refrigerator temperature (7.6°C), and freezer temperature (-5.1°C). Each day, a sterile loop was dipped in the samples and streaked on an agar plate. The plates were then stored in an incubator with a temperature ranging from 35.6–37°C. After 24 hours, the plates were taken out and examined for bacterial colonies. At all three temperatures, the goat milk showed heavy growth, the whole milk showed moderate to heavy growth, and the fat-free showed moderate growth. These results suggest that goat milk has the most bacterial growth, and therefore will spoil the fastest out of these types of milk.

3105

EFFECTIVENESS OF ANTACIDS

R. Garcia, K. Kolahi, I. Mateescu, K. Nash, Z. Ritter, and C. Sams (teacher). University High School, 11800 Texas Ave., Los Angeles, CA 90025.

This study examined the effectiveness of two different brands of antacids, in both crushed and whole form, in neutralizing stomach acid. The expected results were that the crushed Rolaid's antacid would neutralize the stomach acid more quickly due to the fact that it was the most basic, as indicated by the ingredients. One whole and one crushed antacid tablet of two different brands, Roloids and Tums, were dropped in a 50 mL solution of hydrochloric acid with a pH of 1. The amount of time it took for each tablet to dissolve was recorded. Each experiment was repeated three times. The average result demonstrated that the crushed Rolaid's tablet was most effective, neutralizing the hydrochloric acid to a more basic pH of 7 in the least amount of time; 1 minute and 55 seconds. Thus, the original hypothesis was proven correct.

3106

OUTCOME OF EFFECTS OF SIZE ON SPEED OF WHEELS

Alaine Bagamaspad and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91335.

This experiment investigated the question, does size affect the speed of wheels. Two wheels of different sizes were rolled down a ramp and timed. Both tests were repeated six times each. The average of the larger wheel's speed was about 3.36 seconds/7.62 meters whereas the smaller wheel's was about 3.20 seconds/7.62 meters. The conclusion was that size did not influence the speed of wheels greatly.

3107

EFFECTS OF EARTHWORMS ON BEAN PLANT GROWTH

Brian Hanson and D. Shah (teacher). Portola HG Magnet, 18720 Linnet Street, Tarzana, CA 91356-3313.

This study examined the growth of earthworm-affected bean plants. Bean plants were grown with or without earthworms in the soil. Each experiment was repeated in eight different plants for each group. The earthworms made the bean plants grow faster and taller in less time than the bean plants in the control group.

3108

CONTINUOUS GEL ELECTROPHORESIS

Araceli del Rio and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

The purpose of this experiment was to build a continuous gel electrophoresis apparatus that would be able to separate molecules by size. This way, it is possible to test the entire contents of a large reservoir of liquid, be it a pint or a liter, rather than only being able to test a microliter of liquid in a discontinuous gel electrophoresis. The apparatus was slanted at an angle so that gravity pulled down the liquid. Horizontally there was a current of electricity that separated the molecules by size as they ran down, with test tubes collecting the samples. The protein mixture and the buffer were fed continuously on top of the apparatus and the samples were collected at the bottom. Then I ran a vertical gel electrophoresis using samples from each of the test tubes, to see if the proteins were successfully separated. Unfortunately, after several trials the final run was inconclusive. There were not enough proteins in the samples to show on the vertical gel electrophoresis.

3109

THE EFFECT OF CAFFEINE ON THE GROWTH OF MEALWORMS

Isaac Kim and M. Simonds (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This topic is being experimented to see the effect of caffeine on the growth of Zophobas mealworms. There were 9 containers each with 1 mealworm. 3 of the containers had no caffeine put inside. 3 other containers had 10 mg of caffeine put in. The last 3 containers had 20 mg of caffeine put into. Every week the mealworms were measured. The mealworms without caffeine grew about 2–3mm a week. The mealworms with 10mg of caffeine grew about 0–1 mm a week. The mealworms with 20mg of caffeine grew about 0–.5mm a week. The results show that Zophobas mealworms don't grow to their fullest when fed caffeine.

3110

EFFECTS OF COLORED AND FLUORESCENT LIGHTING ON MARTON GRASS

Tomer Ovadia and D. Shah (teacher). Portola Highly Gifted Magnet, 19720 Linnet Street, Tarzana, CA 91356.

This experiment examines the possibility of colored light influencing the growth of marton grass. The grass was grown in boxes, with 4 patches ranging from 11 cm × 12cm to 12cm × 18cm, in each box. Each box included one light bulb, each having different colors or types: 72022 True Blue; 72008 Orange; 20637 Hot Rod Red; 72010 Bright Yellow; 72017 Hunter Green; Warm White fluorescent light bulb 1380 lumen light output 23 watts; Standard bulb 400 lumen light output 40 watts (this bulb is the same type as the colored types, only it wasn't painted); and unmodified sunlight. A control was used outside collecting sunlight, but only had light during day time, therefore all light bulbs were turned off at sunset and turned off at sunrise. The experiment started with dark green, dense, and thick grass. All colors/types other than the sunlight, regular lighting, fluorescent, orange, green and yellow (listed in order from the best results to the worst) resulted in thinner grass with a lighter shade of green. They were graded on a scale from 1 through 5: sunlight A+; standard A-; fluorescent A-; orange B-; green B-; yellow B-; red C; blue D-. The result showed that natural sunlight is most appropriate to use while growing marton grass for the least changes in the grass, and the grass remaining healthy and green. This is probably because the plant needs regular lighting in order to choose the amounts of each color it needs, and if it were to receive only one color, it wouldn't be able to survive. Sunlight turned out the best because it is natural and is what the grass has adapted to and lives with.

3111

WHAT ARE THE EFFECTS OF AIR PRESSURE AND TYPE OF GROUND ON A BASKETBALL'S BOUNCE?

Michael Yeh and D. Shah (teacher). Gasper de Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study showed the effects that air pressure and type of ground had on a basketball's bounce. Basketballs were dropped from a set height of 310 centimeters with 0.422, 0.563, 0.704, 0.844, and 0.985 kilograms per square centimeters of air pressure. Each ball with the same amount of air pressure was dropped onto the following types of ground: carpet, concrete, and wood. The same experiment was repeated with a different amount of air pressure on the three different types of ground. Each experiment was repeated three times. The basketball with 0.422 kg/cm² (kilograms per square centimeter) bounced an average of 154.8 cm on carpet, 167.7 cm on concrete, and 177.4 cm on wood. The basketball with 0.563 kg/cm² bounced an average of 164.54 cm on carpet, 193.5 cm on concrete, and 187.1 cm on wood. The basketball with 0.704 kg/cm² bounced an average of 174.2 cm on carpet, 209.6 cm on concrete, and 199.9 cm on wood. The basketball with 0.844 kg/cm² bounced an average of 174.2 cm on carpet, 212.9 cm on concrete, and

212.9 cm on wood. The last basketball with 0.995 kg/cm^2 bounced an average of 180.6 cm on carpet, 219.4 cm on concrete, and 225.8 cm on wood. The results depicted that air pressure and type of ground change the height of a basketball's bounce.

3112

CALENDULA GROWTH UNDER THE INFLUENCE OF LIQUIDS OTHER THAN WATER

Preston Mendell and D. Shah (teacher). 18720 Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the growth of calendulas, a type of flowering plant, and the effects of water, sugar water, white wine, and milk on their growth. Each day for three weeks, the plants were watered with 125mL of water, sugar water, wine, or milk. The wine plants died almost immediately. The milk and sugar water plants at first grew very quickly. The water plants kept up a normal growth rate. By the end of the experiment, the only healthy looking plants were the water ones. The sugar water eventually caused the calendulas to wither.

3113

WHICH DETERGENT REMOVES STAINS BEST?

Samantha Landau and G. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This study was made to determine which detergent removes stains from white cotton cloth without bleach or other additives. The detergents used were Tide, Planet, All, Wisk, Ultra, and Arm and Hammer. Each piece of cloth was stained with chocolate syrup, ketchup, mustard, red lipstick, Kikkoman's soy sauce, red wine, and grass. A separate cloth for each detergent was washed with a warm wash/cold rinse cycle. The results showed that Tide removed the largest number of stains, with Planet as a close second. Tide did not remove all stains entirely, but took out more color from the stains compared to the other detergents. In conclusion, Tide detergent is best for removing stains from cotton cloth.

3114

pH LEVELS OF DIFFERENT KINDS OF FRUITS

Arthur Kim and M. Simonds (teacher). Gaspar de Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This study showed on which type of fruit (apple, orange, lemon, kiwi, and pineapple) had the highest pH level. Each fruit was freshly squeezed and the pH was measured by using a pH indicator. Apple had a pH of 4, orange had a pH of 4, lemon had a pH of 3, kiwi had a pH of 3.5,

and pineapple had a pH of 4.5. The results suggest that pineapple has the highest pH level, making it the most basic.

3115

WHICH CONFIGURATION OF BATTERIES INDUCES A GREATER MAGNETIC FIELD

D. Leu and D. Shah (teacher). Portola Highly Gifted Magnet Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This project was made to determine which battery arrangement induced a greater magnetic field. The battery arrangements were parallel (| | | |) and serial (---). A circuit was made using a wire-network on the electronic circuitry board (used for testing the batteries). The pins in the tray were recorded. The switch on the board was turned on. The electromagnet was put in the tray with the pins. When the electromagnet was taken out, the pins that the electromagnet picked up were recorded and the switch was turned off. This was repeated three times every time the battery amount increased.

Each battery arrangement was tested with up to four batteries. The results were then averaged out. The serial configuration picked up considerably more than the parallel configuration. The parallel configuration picked up less than the last time, every time. These results show that the serial arrangement works better than the parallel arrangement.

3116

MOLD: WHAT CONDITIONS DOES IT NEED TO GROW?

Jackie Liu and G. Zem (teacher). Ernest Lawrence Middle School, 10110 Variel Avenue, Chatsworth, CA 91311.

This project was done to examine what conditions mold needs to grow. First get six pieces of preservative-free bread. Wet one slightly, leave one dry, touch one, don't touch another, place one in a dark area, and place the last one in light. Put the damp bread, dry bread, the clean bread (not touched), and dirty bread (touched) in semi-light. At the end of the experiment, the damp bread's mold grew the most, the one with bacteria grew a fair amount, the one in the dark grew pretty well, and the dry and clean ones didn't grow so well. Mold likes to grow in dark and damp conditions in temperatures at about 72–87 degrees. Mold also likes to grow on dirty things and bacteria will help it grow, but too much will eventually kill the mold.

3117

WHICH ANTACID WORKS THE FASTEST?

Zak Koretz and M. Simonds (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of which antacid dissolves in stomach acid (0.1M Hydrochloric Acid) the fastest. One antacid tablet of each of the following: Maalox, Mylanta, Tums, Alka-Seltzer, Alka-Seltzer Gold, Gaviscon, Gelucil, and Roloids, were placed in 10ml of 0.1M HCl and the time taken for each to dissolve was recorded. The experiment was repeated twice. The results suggest that Alka-Seltzer is the fastest working antacid.

3118

FUNGI: FROM SNEEZING TO WHEEZING

Lisa Tran and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

Fungi, especially *Alternaria*, have been implicated as triggers for both asthma, an airways disease, and allergies. However, *Alternaria* produces spores that contain allergens but are too large (bigger than 12 micrometers) to be inhaled into the airways. The aim of this project was to determine whether *Alternaria* could release respirable-sized (smaller than 2.5 micrometers) allergenic particles into the air and to determine the environmental conditions that optimize this release. Results show that fungal fragments were released from *Alternaria*, and these fragments are small enough (less than 1.5 micrometers) to deposit in the airways. The collected particles were examined for their allergen content, and mass spectrometry revealed that the particles did contain an allergenic content. Whether the presence of allergenic mold particles in the air is linked to the increasing prevalence of asthma remains to be explored.

3119

PAPER TOWEL ABSORBENCY

Alex Stokes and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study shows how absorbent each of the following brands of paper towels are: Job Squad, Ralph's Brand, Bounty, Brawny, and Scott. Each paper towel was tested by placing 1 cc of water onto 1 sheet of a paper towel suspended on a vertical cookie sheet, until the towel saturates and a drop drips out of the towel. Each towel was tested 10 times. The results of 10 tests were graphed. The mean of the absorbency tests of the Ralph's generic brand was 23.9 cc. The mean of the absorbency tests of the Scott brand was 22.2 cc. The mean of the absorbency tests of the Bounty brand was 22.5 cc. The mean of the absorbency tests of the Brawny brand was 21.6 cc. The mean of the absorbency tests of the Job Squad brand was 53.2 cc. Job Squad is by far the most absorbent.

3120

DO *PSEUDOSINELLA VIOLENTA* COLLEMBOLA PREFER GREEN FOOD COLORING YEAST OR YEAST IN ITS NATURAL BEIGE COLOR?

Anna Orbin and T. Miller (teacher). Parkman Middle School, 20800 Burbank Blvd., Woodland Hills, CA 91364.

I have hypothesized that the species of collembola named *Pseudosinella violenta* will choose to eat yeast dyed with green food color over the natural beige color. I believe this because in previous researched experiments, eyeless collembola have shown that they can detect ultraviolet light. Therefore, I believe that they will prefer green yeast. A simple explanation of my procedures is as follows: First, I used petri dishes with plaster of paris and a charcoal base (9 parts plaster of paris to 1 part charcoal and water). I then took microcentrifuge tubes and colored the yeast with two drops of green food coloring in one and 2 drops of water in the other. I placed approximately twenty collembola in three petri dishes, with five grains of the green yeast on one side of the petri dish and five grains of the beige yeast on the other side of the petri dish. I then observed and collected data for two weeks excluding weekends. My results were in container one and two, only four collembola had eaten the green yeast. I knew this because their guts were green. This data suggests that the collembola in this container preferred the beige over the green yeast. In container three only three collembola ate the green yeast. My hypothesis was proved to be incorrect. The collembola did not eat the green yeast more than the beige, and even seemed to prefer eating beige yeast. I believe more data should be collected for a longer period of time.

3121

DOES CHEESE GENERATE ELECTRICITY?

Daniel de Sosa and D. Shaw (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

The purpose of this project was to prove that cheese does generate electricity. The experiment involved inserting a penny and a galvanized nail into opposite sides of one of six kinds of different cheese variants. The probes of the voltmeter were then placed onto the receivers (negative receiver on the penny, positive receiver on the nail) and the results were recorded. Each experiment was repeated three times. The fact that the cheese did generate electricity proves my hypothesis correct. The variant of cheese known as Jarlsberg generated about ten times the amount of volts compared to the other cheeses. This might be because the bacteria inside of the Jarlsberg might have a higher acidic content than the other cheeses but I do not have the equipment to find out. Swiss Cheese, a type of cheese very similar to the Norwegian Jarlsberg, produces the same amount of electricity as the Jarlsberg does. Perhaps it is the way the cheese is prepared that determines the amount of volts that cheese generates.

3122

THERMO CHEMISTRY

Ghazaleh Lahsaei and G.C. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This experiment was showing the use of heat transfer as a way of finding the property of some metals. It also studied the consequences of different temperatures being added to each other in a calorimeter. In my experiment I had three parts. In every part thermo chemistry was used for different reasons. Thermo chemistry is the transfer of energy in a chemical reaction. In the first part of my experiment we are trying to figure out the calorimeter constant using a Styro-foam cup as the calorimeter. What we did was just measure the temperature changes in 10min once hot water is added to chilled water and then using our data to calculate the constant. In the second part of my experiment I used the calorimeter constant to figure out specific heat and molar mass of an unknown metal. Another way of using Thermo chemistry is using it to figure out an unknown substance such as this metal. We had the temperature of the water before hot water was added and we heated up the metal in a beaker of boiling water, and recorded that too. Then we added the metal and recorded the temperature for the calorimeter for 10 minutes and after 6 minutes, checking it every 30 seconds. Then we gathered up all the data and calculated it out. Then we matched our results with the facts on the table of metal masses and specific heat. In my case my results didn't match so I probably didn't have the right recording or the specific numbers. In the last part of my experiment I was trying to find out the energy gained or lost when water goes from solid to liquid. Since I am using water the solid form of water is ice. So in this case we measured the temperature and weight of the calorimeter, then we observed and recorded temperatures for 4 minutes and on the 4th minute we added the ice and stirred the water until it melts and finally recorded the temperature. After it had melted I weighed the calorimeter again and subtracted it with the mass of the water from the beginning and I got the weight of the ice. Once that was done we started to calculate the exact amount of fusion that occurred. At the end my results were not right and I think that was because I probably measured some things wrong or just did something wrong. So it was not a true answer at the end of the experiment.

3123

WHICH FRUIT JUICE CONTAINS THE MOST VITAMIN C?

Brian Liyanto and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

The juices of fruits (kiwi, orange, lemon, grapefruit, and lime) were tested for Vitamin C content using indophenol as an indicator. Drops of each fruit juice were dropped into 10 mL of indophenol until solution was clear. The number of drops needed was recorded. Kiwi juice had an average of 19.6 drops, orange 22.5 drops, lemon 25.8 drops, grapefruit 29.4 drops, and lime 30.6 drops. The results suggest that kiwi juice contains the most Vitamin C.

3124

EFFECTS OF GRAVITY ON GREEN BEANS

Jesse Gutterman and M. Simonds (teacher). Portola HGM Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment was to answer the question of whether gravity will have an effect on the growth of green beans. Four plastic bags, each containing a piece of cardboard with a packet of beans taped to it, was set to sprout in a constant environment. After the plants sprouted the bags were turned on the side, one facing to the left, one upside-down, and one remaining as a constant (one of the plants had somehow died). After a week the roots had already turned to face down and the stems turned to face up. This result suggests that gravity plays a major role in the directional growth of plants, but does not stunt the growth.

3125

WHICH COLOR WATER ABSORBS THE MOST HEAT?

Jane Shin and D. Shah (teacher). Portola Junior High, 18720 Linnet Street, Tarzana, CA 91326.

This experiment was based on how much heat each color can absorb. The experiment was done with colored water and thermometers. All the five different colored waters were left outside for an hour under the sun. They were all compared and recorded. There was a big difference between the colors black and white. In conclusion, the color black absorbed the most heat. The darker the color is, the more heat it may absorb. The reason the results varied is because of the color pigments. Every object has pigments inside that absorb specific colors from the sun. For instance, strawberries absorb the color pigment "red" from the sun. It blocks out all the other colors and only takes in "red" from the sun. Same thing with lettuce, it can only absorb "green" and block every other color out. Therefore, strawberries are red, and lettuce is green. So on warm days, wear a white shirt because it doesn't absorb any heat, but black objects absorb every color pigment, which contain the most heat.

3126

DOES TEMPERATURE OF CLOTHING AFFECT ITS SIZE WHEN WASHED?

Brian Lee and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of does hot water shrink clothes to a greater extent than cold water. Clothes of different colors were washed with liquid detergent, filled up a quarter of line one. All were mixed in water of 100°C (boiling point) and in another water temperature of 30°C. Area measurements and comparisons were taken. Each experiment was repeated three times. Clothes washed in hot water shrank more than clothes washed in cold water.

3127

WILL ACID RAIN HAVE AN EFFECT ON POPULATIONS OF COLLEMBOLA?

Rebecca Stern and T. Miller (teacher). Parkman Middle School, 20800 Burbank Blvd., Woodland Hills, CA 91364.

The purpose of this experiment was to determine if acid rain would have a negative affect on a species of collembolla called *Onychiruidae encarpatus*. My hypothesis is that collembolla will be negatively affected by acid rain. Collembolla are microscopic hexapods that eat mold. Small habitats for the experiment were prepared by mixing plaster of paris, charcoal, and water in three containers and then placing twenty collembolla in each of them. I then created acid rain by adding vinegar to clean tap water until it had a pH of 6.4, which I measured with a pH meter. For the next eight days, I watered two containers with four drops of acid rain. One container was watered with four drops of water as a control. The collembolla were given yeast to eat. I observed the collembolla and recorded the results. My hypothesis was incorrect, as none of the collembolla I tested died and they had a higher rate of reproduction.

3128

CAN A LAYER OF OIL REDUCE THE RATE OF WATER EVAPORATION?

Vincent Wang and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Ave, Chatsworth, CA 91311.

My project was about oil and water evaporation. The problem was, could a layer of oil reduce the rate of evaporation. For this problem, I created a hypothesis. My hypothesis was that oil could reduce the rate of evaporation. I started this project by first getting five empty jars. After I got the five jars, I filled them up with water. It had the total height of 6.4 cm in each jar. Then I added the oil to all the jars. The first jar contains no oil. The second jar contains one drop of oil and the third one had five drops of oil. The fourth one had one teaspoon of oil in the water. The fifth one contained one tablespoon of oil. I then recorded the heights of each jar daily. As a result, I proved my hypothesis correct. After I recorded the information, the rate of evaporation for the first jar compared to the fifth jar was a large difference. The fifth jar lost water much slower then the first jar.

3129

THE AMOUNT OF ABSORBANCY BETWEEN BRANDS OF DIAPERS

Min Soo Kim and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

The study examined which brand of diaper absorbed and held in the most amount of liquid. Blue water was poured into the following brands of diapers: Huggies Supreme, Pampers

Cruisers, and Luvs Leakguard. Each experiment was repeated 10 times. The Huggies Supreme diaper held in the most liquid in all 10 trials. The Luvs Leakguard diaper absorbed the second most amount of liquid in 6 trials but held the least liquid in the remaining 3. The Pampers Cruisers diaper held in the least amount of liquid except for in 3 out of the 10 trials. The results suggest that the Huggies Supreme diaper holds in the most liquid out of the other two and doesn't leak as quickly.

3130

DOES COLORED LIGHT AFFECT DWARF SEA PINK PLANT GROWTH?

Sharon Wu and D. Shah (teacher). Portola Highly Gifted Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment observed the effect of colored light on Dwarf Sea Pinks, a breed of Sea Pinks, or *Armerisa maritime*. Dwarf Sea Pinks were kept in boxes wrapped in red, blue, green, purple, or clear plastic wrap. They were also watered with 1 cup of water per day and were measured in centimeters and weighed in kilograms. Pictures were also taken on the first, fourth, and last days. The results indicate that colored light does not affect plant growth, although the plants growing in the clear-wrapped boxes did grow better.

3131

EFFECTS OF SOAKING TIME AND TREATMENT ON DIFFERENT TYPES OF FABRICS BEING DYED

Sumita Misra and D. Shah (teacher). Portola Highly Gifted Magnet Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined the results of what different factors affect how well a fabric absorbs color. Five fabrics were cut up into sixteen pieces each. Four pieces were washed and soaked in a tray for 15 minutes. Four other washed pieces were also soaked in the dye, but for 30 minutes. Then all eight pieces were washed and set out to air dry. Then four pieces of non-washed fabric were soaked for 15 minutes. Four other non-washed pieces of each fabric were soaked for 30 minutes. Observation of the darkness and depth was considered. 65% cotton/35% polyester and 100% cotton both turned out with the best color. The conditions were that they were unwashed and soaked in a tray for 30 minutes. The results help to conclude that a pure cotton cloth or cloth with a dominant percentage of cotton dye is best. The results also point out that soaking a cloth in a dye bath for a longer time causes it to absorb the most color.

3132

EFFECTS OF SALT AND SUGAR ON PLANTS

Anthony Valera and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

The purpose of this experiment was to determine what substance, like salt and sugar, when dissolved in water, will affect the growth of the plants: Dwarf Sea Pink, Dwarf Candytuft, and Blue Bird. I hope to see which substance has the greatest effect. I know salt is used to melt ice on winter roads. I was concerned it would create some kind of problem for the local vegetation around the roads when the ice thaws. The information gained from this experiment will help people make better decisions about the substances to use around plants. I had three separate groups of plants, which is one of each plant I listed above. One group was fed water, another group was fed salt and water, and the last group was fed sugar and water. I did this for three weeks. My result was that water made the plants grow strong and tall. The plants fed with sugar were really tough. The plants fed with salt were killed.

3133

EFFECTS OF FRICTION ON ACCELERATION

Patrick Owens and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the effects of different surfaces on the acceleration of a tennis ball. The ball was rolled down a 121.92cm long, 5° incline on the surfaces of a wooden board, cotton felt, 60-grit sandpaper, 320-grit sandpaper, and standard printing paper. This was done three times. A stopwatch was used to determine how long it took the ball to roll down each of the surfaces in the three trials. In seconds, the results for how long it took the ball to roll down the incline of each of the surfaces in the trials are as follows: board- 3.16, 3.34, 3.34; felt- 3.38, 3.84, 3.34; 60-grit- 3.50, 3.09, 3.22; 320-grit- 3.37, 3.22, 3.31; paper- 3.37, 3.12, 3.32. With such a little range in time and such a wide range in surfaces, the results suggest that friction gets increasingly significant on larger scales.

3134

EFFECTS OF COLORED LIGHT ON PLANT GROWTH

Sarah Livingston and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment studied the possibility of light color having an effect on pea and radish plants. The seeds were grown under four colors of saran wrap, which was used to filter out other colors of light. In the radishes, 100% of the seeds planted sprouted, with the plants under

blue light being the healthiest. In the pea plants, 90% of the plants in blue light sprouted, 80% in green and purple light, 70% of the control plants, and 60% in red light. The results suggest that plants grown under blue light grow best, which may point in the general direction of plants growing best in light with a higher wave frequency.

3135

WHICH ANTACID WORKS THE BEST?

Jacob Margolis and Mr. Zem (teacher). Lawrence Gifted Magnet Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

In my science experiment I tested different antacids to see which one would bring the vinegar pH level to the highest pH level, and which one would dilute the acid in it the best. I tested the pH level by using small pH strips called Accu Grow. What I did was first stick the little pad at the end of the strip in the liquid. Then I turned the pad right side up and matched the color of the pad with the color on the bottle. Under the colors on the bottle there were numbers indicating the pH level.

In the beginning of the experiment I took 1 tablet of Tums, 500 mg, and crushed it up into powder with a mortar and pestle. After that I filled up the beaker to about 50cc. When the beaker was filled up to 50cc with water I then took 3ml of white distilled vinegar with an acid content of 5% and sucked it into a syringe. After that I mixed the Tums and the water together. I found out that the level of pH was 8. I found interesting that the pH was that high. After I did that I added the 3ml of vinegar and mixed everything together. The pH level decreased greatly. It went from 8 to 5. I performed this experiment two more times, and the levels were different. The levels the second time I performed this experiment were 8 and 6, and the third time I performed the experiment the levels were also 8 and 5. This was actually somewhat interesting, showing that Tums worked fairly well as an antacid.

The other antacids I tested were Roloids, Gas Gone, and Alka Seltzer. All of these are over the counter drugs to help fight heartburn. For Roloids the numbers I got were 8 and 6.5. For Gas Gone I got the numbers 8 and 5 for the first test, and 8 and 4 for the second and third ones. Finally Alka Seltzer in all the tests came up with the number 8 for everything. This is very good, because the pH level is high. Alka Seltzer gives the best and fastest relief.

3136

WHICH BRAND OF BACON BURNS OFF THE MOST FAT?

Calen Weiss and M. Simonds (teacher), Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment answers the question of which brand of bacon produces the most liquid fat. After weighing and cutting each brand of bacon to 124 grams, the bacon was cooked over an open skillet on medium for 9 minutes (the bacon was turned 4 and a half minutes in). The bacon

fat was poured into a measuring cup, measured and then weighed. Then the remaining bacon was weighed. Hoffy burned off the most fat in milliliters and Oscar-Mayer burned off the least.

3137

WHAT ARE THE EFFECTS OF CERTAIN CONTAMINANTS ON THE GROWTH OF RADISH SPROUTS?

Sally O'Connor and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

My experiment investigated the effects of bleach, tobacco and coffee on the growth of radish sprouts. I planted 15 radish seeds for each contaminant and a control group. I watered each contaminants group with 15 mLs of that certain contaminant a day. I continued this for 19 days. The control group's seeds started sprouting within 3 days, the tobacco and coffee's sprouts grew within 5 days, and the bleach's group grew within 6 days. At the end of the experiment the control sprouts were the tallest and healthiest, the coffee and tobacco's sprouts were worse than the control groups, but better than the bleach's group. I concluded that watering your plants with water is the best way to go.

3138

WHICH POLLUTANT IS MOST HARMFUL?

Jorge H. and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

The original purpose of this experiment was to determine the effects of pollutants on aquatic life. The results of this experiment showed that the different pollutants did indeed have a negative effect on the *Daphnia pulex*. The most lethal pollutant was oil, followed in order by, lignin sulfonate, milk, and antifreeze. Oil was so toxic that with the equipment I had, I couldn't get a concentration low enough. My lowest concentration, 0.02 mL of water, is equivalent to 200 liters of oil in one million liters of water. In the acute test, antifreeze was more lethal than milk, but in the chronic test, it was less lethal. When the results of acute test number one are compared to acute number two, for milk and antifreeze, the concentrations of acute number one were less lethal than the lower concentration of the second test. The results of the lignin sulfonate chronic test show that even at low concentrations, it is lethal over a longer period of time. These test results show that this type of test has a great degree of variability.

3139

EFFECTS OF COLORED PLASTIC WRAP ON SEED GERMINATION

Kathie Sierra and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356-3313.

This study examined the question of possible plant germination in radish seeds, *Raphanus sativus*. Seeds put into clear plastic cups with some water covered with three different colors of plastic wrap; clear, rose, or green. Each experiment was repeated three times and watched for five straight days. The seeds with the clear wrap did not germinate as quickly as either the rose or green wraps. The results suggested that rose and green plastic wraps are more effective for radish seed germination.

3140

FRICITION OF VARIOUS SURFACES AGAINST TOY CAR WHEELS

Zach Goldstein and Mrs. Darshana Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment examined the question of friction against the wheels of a toy car by the texture of a surface. A toy car was rolled down a ramp onto four different surfaces: sandpaper, felt, linoleum, and carpet. Each was tested 12 times to produce the most accurate results. The car rolled the farthest on the linoleum floor; an average 334.3 cm. It rolled an average 156.7 cm on sandpaper, 129.4 cm on felt, and 116.6 cm on carpet. The results suggest that a cushioned surface may affect rolling resistance more than a rough textured surface.

3141

WHICH STAINS TEETH FASTEST: COKE, PEPSI, OR COFFEE?

Michelle Yoon and Mrs. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This was an experiment on which liquid stains teeth the fastest. The three liquids tested were Coke, Pepsi and Coffee. Three cups were arranged for each of the three liquids and eggshells were dropped in each of the cups. A period of five days passed and the results came out clearly. Coffee stained the eggshells the most and no white spots were visible. Coke came next and stained the eggshells a little less than coffee. Although Pepsi and Coke were almost identical, Pepsi's eggshells were slightly lighter.

3142

EFFECTS OF ACID RAIN ON GERMINATION OF *PHASEOLUS VULGARIS*

Kimberly Chuang and M. Simonds (teacher). Portola Middle School, 1021 Navellier Street, El Cerrito, CA 94530.

This study scrutinized the effect upon germination of *Phaseolus vulgaris* watered with a solution of pH 4 in comparison with those watered with pH 7 solution. Two simultaneous experiments were conducted with the Bush Kentucky and King Kentucky varieties of *Phaseolus vulgaris*. One plant of each genus was watered for 3 weeks, once every week, with a solution of pH 5.6. The other, the control, was watered with pH 7 distilled water. Results subsequent to 3 weeks showed the control growth at 5.5 cm for the Bush Kentucky and 11.8 cm for the King Kentucky. The acidic growths were recorded for the King Kentucky as 12.6 and 11.3 for the Bush Kentucky. The results suggest that acidic content of water assists in the organic development of *Phaseolus vulgaris*.

1343

COMPARISON OF AUDIO AND VISUAL MEMORY IN HUMANS

Susana Cervantes and D. Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study compared the retention of audio and visual memory in humans. Fifty-six test subjects were first shown 10 flashcards with various objects on them. Then they were asked to write down as many of the objects that they could remember. They were then read the names of 10 different objects. Then they were asked to write down as many of the objects that they could remember. The average person remembered 7.25 objects from the flashcards and 6.48 of the objects that were read to them. The results suggest that visual information is remembered better.

3144

EFFECTS OF DIFFERENT SUBSTANCES ON THE BROWNING PROCESS OF APPLES

Young Im and M. Simonds (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This study examined which substances slowed down the browning of an apple the most. Freshly sliced apples were dipped in water, vinegar, apple juice, and baking soda and the time of the apples when they had turned brown was recorded. Each experiment was repeated 10 times. It took water an average of 2970 minutes to turn the apple brown. Vinegar turned the apple brown within an average of 116 minutes. Baking soda took an average of 172 minutes to turn the apple brown. Apple juice turned the apple brown within an average of 162 min. The results show that water slowed down the browning process of the apples the most.

3145

TIDE EXPERIMENT: DOES TIDE BLEACH ACTUALLY TAKE OUT STAINS AS PROMISED?

Iris Yang and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

The purpose of the experiment was to determine whether or not Tide took out the stains it promised it would. A large white tee shirt was taken and smeared with different kinds of substances, such as strawberry jam, ketchup, mud, grass, cough syrup, lipstick, gum, chocolate, and pen marks. After placing the shirt in the washer and then the dryer, observations were done. The results were that strawberry jam, mud, gum and chocolate stains were taken out. Ketchup, grass stains, cough syrup, lipstick, and pen mark stains were still there after being washed with Tide Bleach. The results conclude that Tide Bleach does not take out everything that they promise it will.

3146

EFFECTS OF MICROWAVE RADIATION ON THE GROWTH OF RADISH SEEDS

Ronald Masson and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study investigated the potential role of microwave radiation in the growth of Cherry Belle radishes (*Raphanus sativus*). Seeds were placed in cups containing paper towels saturated with 100 mL of water, and were put in a microwave for 5, 10, and 15 seconds. The growth of each seed was then measured in mm for six days. The experiment was repeated three times. The averages of the growth of the seeds, from all the trials, were as follows: the group exposed for 5 seconds had growth of 51.6mm, 34mm, and 30.4mm; the group exposed for ten seconds measured 54.8mm, 47.4mm, 65.4mm, the group exposed for 15 seconds measured 2.8mm, 75.2mm, 32.2mm. The results in this study were too varied to provide any solid conclusion; the experiment will need to be repeated many more times to provide any useful data stating whether or not microwave radiation has any effect on *Raphanus sativus*.

3147

EFFECTS OF PESTICIDES ON PLANTS

FM Mashruf Yasdani and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examined the question of whether or not pesticides affect the growth of plants and their overall development. 45 individual radish plants were sprayed with pesticides from 3 different companies, Garden Safe, ORTHO, and Spectracide; 5 plants for each pesticide. Five

more plants were left alone, this was the control group. The plants in the Control group had good posture, healthy, plentiful leaves, and strong roots, but they also had an average plant color and a relatively dull shade of it. Each of the plants in the three groups excelled in one aspect. For example, plants in the Garden Safe group had superior color, but lacked firm roots. The results suggest that pesticides do more than just kill insects, they sometimes destroy roots, sometimes make radishes taste bad, and sometimes make plants go limp quicker. However, not everything a pesticide does is bad. Pesticides sometimes make the plant's color more vivid and last longer. Other pesticides, like ORTHO brand pesticides, fortify plants with much needed vitamins and minerals often not obtained alone from the soil.

3148

EFFECTS OF POTTING SOIL AND GARDEN SOIL ON CACTI

Emily Grubman and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment studied whether cacti survive well in potting soil, garden soil, or its normal cactus (control) soil. Nine cacti were planted in 3 pots of cactus soil (control), 3 pots of potting soil, and 3 pots of garden soil. They were watered every 5 days and height was recorded. 34 days later, the final height was measured and the average of each of the 3 groups was made from the difference of the two heights. The average of the control group is 2 cm, the average of the potting soil is 1.7 cm, and the average of the garden soil is 1.2 cm. The results suggest that the cactus soil is what cacti grow best in.

3149

THE MOST EFFECTIVE FORM OF INSULATION

Nicholas H. Yoo and G.C. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This experiment was performed in order to test the effectiveness of various forms of insulation and to determine which would effectively retain the most heat and serve as the best for warming the human body. Three containers containing water 138°F were placed in three different shoe boxes with different insulating materials placed inside. Sponge, fiberglass, and cotton balls were fastened one inch thick around each box. The boxes were placed in the refrigerator, and the temperatures were recorded every 15 minutes, for 75 minutes. The results suggest that cotton would be the best insulator. Then it would be the fiberglass, and lastly the sponge.

3150

**EFFECT OF SUGAR-WATER, SALT-WATER AND TAP WATER
ON GROWTH OF GREEN BEANS**

Diana Prepelitsky and Mrs. Simonds (teacher). Portola HG Magnet Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment studied the effects of sugar water, salt water, and tap water on the growth of green beans (*Phaseolus vulgaris*). Green bean seeds were placed in plastic cups lined with paper towels. A solution of salt water was made with 100 ml of water and 1 ml of salt. The same with sugar water, 100 ml of water and 1 ml of sugar. Almost every day, plants were checked for moistness, and on those days when paper towels were moist 20 ml of each solution was poured into their own special cup. There were 4 seeds in each cup. Each trial had 3 cups, salt water, sugar water, and the control, tap water. There were 3 trials. The results of the experiment show that water was most effective and fastest in the growth of seeds. Sugar water came in second and salt was last.

3151

**REACTIONS OF SNAILS TO DIFFERENT TYPES OF LETTUCES COATED
WITH DIFFERENT STRENGTHS OF COFFEE SOLUTIONS**

Siena Leslie and D. Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examined whether applying different strengths of coffee solutions to four different types of lettuces would deter the common garden snail, *Helix aspersa*, from consuming the lettuces. The study also examined whether or not *Helix aspersa* preferred to consume certain types of lettuces. There were five trials of the experiment, in which *Helix aspersa* were placed in boxes contains untreated lettuces and lettuces dipped in coffee solution. One trial allowed the *Helix aspersa* to choose what types of lettuce they preferred to eat without any coffee solution. The experiment was then repeated four times to test the effectiveness of instant coffee solutions diluted to a 50% and 25% strength of the original, with each dilution tested twice. The results suggest that *Helix aspersa* do not consume as many darker lettuces as they will of the lighter-leafed lettuces, regardless of whether coffee is present. The results also suggest that while the 50% dilution of coffee may repel *Helix aspersa*, the 25% dilution does not have a measurable effect.

3152

SUGAR MAKES SNAILS MOVE FASTER

Esteban Selaya and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study examines the question, can sugar make a snail move faster. Snails were given a mixture of sugar and water in the food that was given to them. Exactly 5ml of water to 1ml of sugar. The snails were timed on how fast they could get away from the light and out of the circle drawn. The experiment was repeated 5 times for each snail. The results were that the snails that were given sugar in their food moved sometimes over double the speed of the speed of the snails that were not given sugar. So, the results suggest that sugar can increase a snail's ability to move.

3153

UNTITLED

Kevin Park and Mrs. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the effects on how the depth of the radish plant *Raphanus sativus*'s burial affects its growth. Nine cups were taken and they were marked from A-1 to C-3 in which the first cup was marked A-1, the second A-2, and so on. Then, the three "A" cups were filled with 3 centimeters of soil. Then, the "B" cups were filled with 6 centimeters of soil. Next, the "C" cups were given 9 centimeters of soil. When this was all done, radish seeds were planted in all 9 cups. Finally, the "A" cups were topped off with nine centimeters, the "B" cups were given 6 more centimeters of soil, and the "C" cups were finished with 3 centimeters of soil. The nine cups were given $\frac{1}{8}$ of a cup of water two times each day and were put in a sunny area. By day 10, all of the "C" cups seeds had germinated while all the "A" and "B" cups' plants did not germinate yet. After 18 days, the "C" cups had the tallest plants against the "A" and "B" cups. The study suggests that the *Raphanus sativus* grows faster and taller when planted underneath just three centimeters of soil than six or nine centimeters.

3154

EFFECTS OF DIFFERENT TYPES OF WATER ON SUNFLOWER PLANTS

Derrick Im and D. Shah (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This experiment was tried to see if the type of water would affect a sunflower plant's growth. An even amount of soil was put into each of the 5 pots. A couple of sunflower seeds were put into each of the pots. For the next three weeks, the seeds were watered with their specific kind of water. The first pot was watered with tap water. This was the control. The second was watered with sugar water. The third was watered with salt water. The fourth was watered with carbon-

ated water. The fifth and last one was watered with drinking water. These four were the experiments. After three weeks, this experiment was tried one more time. After all my experiments, what the results said was clear. The type of water does affect a sunflower plant's growth. The sugar and carbonated water helped a sunflower plant's growth the best. Drinking water was about the same as tap water. Salt water seemed to kill the seeds or something like that because in both experiments, the seed failed to grow at all.

3155

WHICH PAPER TOWEL ABSORBS THE MOST AMOUNT OF WATER?

Ben Bernal and D. Shah (teacher). Gaspar de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This was an experiment to see which brand of paper towel absorbed the most water. There were five brands used in this experiment: Brawny, Bounty, Scott, Thirsty, and Vons. The paper towels were placed inside a pan filled with 500mL of water. After the water was absorbed by the paper towels the excess water dripped back into the pan and the water that was left in the pan was recorded. Each experiment was tested seven times with each brand of paper towel. The results proved that Brawny was the most absorbent paper towel.

3156

HOW DOES TEMPERATURE AFFECT THE BOUNCINESS OF A RACQUETBALL?

Tedrick Leung and Mary Simonds (teacher). Portola Middle School Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This experiment studied how the temperature of a racquetball would affect its bounce. To get a base line, the racquetball at room temperature was dropped five times from a height of one meter. Then the racquetball was placed in the refrigerator for three hours and it was dropped five times. Finally the racquetball was placed in a pot of boiling water for ten minutes and it was dropped five times. The heights were recorded. The whole experiment was repeated except for the second time, the racquetball was in the boiling water for 20 minutes. The results suggest that the hotter the racquetball, the higher it will bounce.

3157

DETERGENT THAT WORKS BEST ON COFFEE STAINS

Mark Na and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined what detergent worked best on coffee stains. 350mL of coffee was poured on a shirt and put in a bucket. 2 liters of water was poured into the bucket and 100 milliliters of detergent was poured into the bucket. The shirt was washed for 5 minutes.

This was repeated with 3 different detergents: Cheer, Tide, and Sun. Each detergent was used 8 times. The results showed that Cheer was the best for 350mL of coffee.

3158

“LUNG WARS”—CAN SMOKERS OR NON-SMOKERS HOLD THEIR BREATH LONGER?

Jay Chin and Mrs. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment examined whether smokers or non-smokers can hold their breath the longest. People were timed on how long they could hold their breath, and then it was recorded. This experiment was repeated 100 times (50 smokers and 50 nonsmokers.) The results were that non-smokers could hold their breath longer than smokers can.

3159

THE BALANCE OF NATURE

I.H. Nguyen and G. Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

The experiment was done to examine which different combination of snails and plants support life the longest. Freshwater snails and aquarium plants were used. The two different controls and variable experiments were repeated twice. One control contained just the freshwater snails and the other just the aquarium plants. The one variable contained both the freshwater snails and the aquarium plants, Elodea. Each day a dissolved oxygen kit and pH test kit were used to measure dissolved oxygen and pH levels. The color of the plants, health of the snails, water clarity, and temperature were also observed and recorded. Over time, the plant's leaves turned brown and grew smaller in size in the control jar with plants only. The health of the snails was best in the variable jar. The snails were more active and larger in size than those in the control jar, in which most died. Those that didn't die stayed stuck to the side of the glass jar. The water was mostly cloudy or dirty in the jar that contained only the Elodea with the browned leaves floating around. The second cloudiest was the control that contained a few feces and the leaves that turned brown, and the jar with the snails only was neither cloudy nor dirty. The dissolved oxygen levels showed that the control only had a little more oxygen than the others. The snails only jar had the least oxygen and the variable was in between. No difference was seen in the pH levels, which were in the basic range of 7.4. The temperatures were the same in all jars at 65 degrees Fahrenheit. The experiment showed that the snails and the plants together provided for one another and therefore are essential to a balanced cycle, as the Earth creates. The snails give out waste and the plants convert the carbon dioxide into oxygen. Then the snails take in the oxygen and give off waste and the whole cycle begins again.

3160

WHICH DETERGENT CLEANS STAINS BETTER?

Zack Ewing and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

For my science fair project I attempted to conduct an experiment to determine the better household cleaner: Shout, Oxyclean, or Clorox bleach. I thought that if Clorox was applied to a stain it would clean better than Oxyclean and Shout because it contained bleach. In my experiment I used grass to create my stains because grass seems to be a very common stain in my house. Fortunately, I came across no difficulties in my entire experiment, but my dog almost ate my entire first trial of the experiment. After applying all of the stains to different squares and then applying the cleaners in their various ways I came up with some very interesting results. In my experiments I found that the most effective stain remover was in fact Shout. Shout contains concentrated stain fighting substances that Clorox lacks. Clorox merely fades the stain, but it doesn't remove it.

3161

WHICH BATTERY LASTS THE LONGEST OUT OF FOUR DIFFERENT BRANDS?

Griselda Delgado, Maria Gonzalez, and Eric Knudten (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

The purpose of this experiment was to see which battery lasts the longest out of four different brands. The materials we used were four of the same type and size flashlights, two D-size batteries from four different brands, and two extra batteries to test the flashlights before we started our testing. Our results were very astonishing. We had thought Duracell was going to last the longest. To our big amazement, Panasonic lasted the longest. In conclusion, Panasonic was the best battery we tested. It outlasted all others by at least two hours.

3162

WHICH MATERIAL KEEPS ICE CUBES FROM MELTING FOR THE LONGEST TIME: NAPKIN, TOILET PAPER, OR TOWEL?

Miri Im and Ms. Shah (teacher). Gasper de Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This Experiment measured the amount of time in which an ice cube melted when placed on different materials. After the ice cubes were placed on the different materials, they were timed until they melted. Toilet paper, napkin, and towel were used to conduct this experiment. After three trials, the ice cubes melted the slowest on the toilet paper and melted the fastest on the towel. The napkin did not make the ice cube melt the slowest or the fastest. The toilet paper is the best to keep ice or water cold.

3163

WILL DIFFERENT LIQUIDS AFFECT PLANT GROWTH?

Grant Voorhees and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This study is on if different drinks affect plant growth? Do you think plants will be affected in a good or bad way? I predict that the plants with the drinks that are good for us, such as apple juice, will do better than tap water. I also predict that the plants with warm liquids will grow better, because the warm liquid will kill some of the germs. I took 15 similar plants called *Primula Malacoides* Mix. I watered them every other day with tap water, filtered water, Gatorade, Coke, and apple juice. I fed them an amount of 4 ounces. I had three plants for each group of liquids. My plants had been watered with hot, room temperature, and cold liquids from the groups listed. I feed them for a time period of 3 weeks. I took pictures and measured them every Saturday. They were placed in half shade and half sun, where they thrive. I left them in a wide-open space. I predicted that the apple juice plants would do good because apple juice is good for us. I won't measure the height every week, because not all the plants started at the same height. I started on December 28, 2002 and finished January 18, 2003. I took the data and wrote the height of the plants weekly. When I am done with the experiment, I will make tables showing the growth and see which one grew the most. I will also have many pictures that are taken weekly on a digital camera. I have many pictures now and have made a graph. I also wrote all the heights and got all the differences for the plants. I learned that most of the liquids such as Gatorade, Coke, and apple juice helped the plant for a little while, and then killed them. I think some drinks that are good for us will be good for a plant, but too much of a good thing is a bad thing, and so I would give my plants some drinks once in a while, but not daily.

3164

HOW DOES SUGAR AFFECT THE GROWTH OF YEAST?

David Litvak and M. Simonds (teacher). Gaspar de Portola Highly Gifted Magnet Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment tested the productivity of yeast (*Saccharomyces cerevisiae*) in direct relation to the amount of sugar it is exposed to in a given environment. Six packets of Saf Active Dry Yeast (7g each) were added to six 400mL beakers, one packet to each beaker, with each beaker already containing 60mL of tepid tap water and containing either 15g, 7.5g, 5g, 3.75g, 2.5g, or 1.25g of table sugar. The height of the foam was recorded over a one-hour period at 15min intervals. The experiment was repeated 4 times. Overall, the results show that the beaker containing 15g of sugar had foam that rose an average of 3.775cm, the beaker with 7.5g had foam that rose an average of 4.6cm, the beakers with 5g and 3.75g each had foam that rose an average of 5.35cm and 5.225cm respectively, and the beakers with 2.5g and 1.25g each had foam that rose an average of 4.775cm and 4.15cm respectively. However, the results also show that over the course of an hour, the beaker with 15g of sugar had foam that had fallen back to an average height of

3.475cm, the beaker with 7.5g had foam that had fallen back to an average height of 3.375cm, the beakers with 5g and 3.75g each had foam that had fallen back to an average height of 3.375cm and 3.375cm respectively, and the beakers with 2.5g and 1.25g each had foam that had fallen back to an average height of 3.825cm and 4.15cm respectively. The results suggest that 5g of table sugar, when mixed with 60mL of tap water and 7g of active dry yeast, will rise the highest, but that 1.25g of table sugar, in the same mixture, will be the most stable over time.

3165

THE MOST EFFICIENT TYPE OF WATERWHEEL

Phillip Choi and D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This project examined the question of which type of waterwheel was most efficient out of an undershot wheel, an overshot wheel, and a breast wheel. Each wheel was tested 5 times and the averages for the numbers of rotations in 10 seconds were for the undershot wheel, 13.2 rotations, for the overshot wheel, 17.6 rotations, and for the breast wheel, 13.4 rotations. Therefore, the most efficient wheel is the overshot wheel.

3166

DOES THE SWING OF A PENDULUM DEPEND ON THE WEIGHT, LENGTH OR AMPLITUDE?

Michael Chiu and Greg Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

From my recent work with pendulums, I learned that only the length has a factor in the length of the pendulum's swing length. In my experiment, I created a pendulum model out of PVC pipes and performed my experiment for all three variables including Length, Amplitude, and Weight. After many different trials of each, I was able to clearly see that only the Length of the cord had an effect on the swing length. From research done, I learned this relationship can be shown by the equation $T=2\pi\sqrt{L/G}$, where T stands for time, L stands for Length of cord, and G stands for the amount of gravity in that place. Using this equation, you can determine the swing length of a pendulum anywhere given you know the values for the variables.

3167

DO BATTERIES REALLY KEEP GOING, AND GOING, AND GOING, AND GOING . . . ?

Jessica Suarez, Marlene Velez, and Mike Oliver (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

Our experiment is “Do Duracell batteries last longer than other batteries?” Our hypothesis is that from the different batteries that we used, that most expensive one will last the longest of all of the batteries. The batteries we used from the most expensive to the least are the Rayovac rechargeable batteries, the Energizer and Duracell batteries priced the same, Rayovac batteries, and the RadioShack batteries. The order in which batteries lasted from the most to the least amount of time was: Energizer at 5 hours and 15 minutes, Duracell at 4 hours and 10 minutes, Rayovac at 3 hours and 40 minutes, Rechargeable Rayovac at 3 hours and 30 minutes, and RadioShack at three hours. In conclusion, our results show that the Energizer batteries lasted the longest and the RadioShack batteries lasted the least amount of time. The RadioShack batteries were the ones that cost the least and the Energizer batteries were the ones that cost the second most.

3168

CO₂ AND PLANTS

Elisa Mills and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

This project determined the levels of CO₂ removed from the atmosphere with the various amounts of acid in the soil. The water plants received had pH levels of 4.0, 4.5, 5.0, 5.5 and 6.0. Each plant was enclosed in its own environment (glass box) and received 100 mL of the acidic water each day. The measurements of CO₂ were determined by the CO₂ probe connected to the computer. The measurements were taken once a week for three weeks. There was no significant reduction of CO₂ in the atmosphere.

3169

USING HOUSEHOLD SUBSTANCES TO MAKE VISUAL COMPARISON BETWEEN DNA EXTRACTED FROM CHICKEN LIVER, DRIED PEAS, AND DRIED PINTO BEANS

Rudy Gomez and Oryla Wiedoeft (teacher). Chatsworth High School, 10027 Lurline Avenue, Chatsworth, CA 91311.

The purpose on my experiment was to see if DNA extracted from dried peas, dried pinto beans and chicken liver, would look the same to the naked eye. I hypothesized that the DNA

extracted from chicken liver, pinto beans, and split peas would look identical. I made this prediction based on two facts. DNA is made from the same four deoxyribonucleotides, and I was using the same substance and method to extract the DNA.

My method in doing this experiment is to extract DNA from a half cup of peas, beans, and chicken livers using substances that are found around the house or can be purchased from the grocery store. The substances I used were salt, MSG, liquid soap, and rubbing alcohol. I also used a blender, strainer, measuring cups, and test tubes.

First I set up the equipment and gathered all the substances. I got them into the blender and poured water into it. I blended the peas on high for 15 seconds and then I got a strainer and put it on top of the container I was going to pour it in, and poured and let all the blended peas mixed with the water go through.

In the second part of my experiment I added soap detergent into the liquid and mixed it without making bubbles. The soap broke apart the phospholipid bi-layer of the cell membranes. After I mixed it I let it sit for 5 minutes while it was sitting I set up the test tubes to pour it into. Also while I let it sit I had another set of clean equipment and poured the beans into the blender and blended it with water. I used the same method with the pinto beans and the chicken liver as I did with the peas.

After the peas had set with the soap I poured $\frac{1}{3}$ into a test tube. Then I added a pinch of MSG, a protease that breaks up histones the DNA is wrapped around, and help linearize the DNA. I mixed it gently because otherwise the DNA would break. I let the test tubes set for about 30 seconds and then I added the same amount of rubbing alcohol as there was pea "soup." As soon as I added the alcohol the DNA rose to the middle, between the alcohol and the blended peas.

After observing the test tube I saw many differences. I saw the DNA in between the substance and the alcohol and it looked slimy and gross. The DNA was all stuck together except for the chicken liver DNA, which looked flaky rather than slimy. I saw the dried peas had a lot more DNA than the other substances did. The chicken liver's DNA was more broken up then together, so it looked like a bunch of things floating around. The dried beans DNA was almost like the peas but a lot darker and had less DNA.

My results did not support my hypothesis because all three DNA samples looked different in many ways. The dried peas looked more like what I thought DNA would look like because it was slimy and floating in a large amount and was stuck together. The pinto bean's DNA was dark and not so slimy looking, and it was also not so much together in a clump. The chicken livers were all in little flakey chunks and not clumped together at all. In further experiments I plan to see what these types of DNA would look like if I purified them after extraction.

3170

FAIR PLAY: HUMAN BEHAVIOR IN AN ECONOMIC EXPERIMENT

Alexandra Kay Kushner and Mr. David Hinden (teacher). Harvard-Westlake School, 3700 Coldwater Canyon, North Hollywood, CA 91604.

Most theories of economics assume that people behave according to what is best for themselves (their self-interest). Results of recent experiments show that this is often not true. In fact, these studies indicate that many people take fairness into consideration when making decisions about financial transactions.

Purpose: The purpose of this study is to determine whether college students seek to maximize their profits when given a choice between selling a used textbook to the college bookstore for a set price or selling the textbook to a (unknown) fellow classmate.

Methods: 33 college students were the subjects of this study. They were given the following information on a written questionnaire:

“A bookstore buys used textbooks at the end of the school year and then sells them to students who are taking that class next year. The bookstore will sell a used textbook for more money than it spends to buy that textbook. Every student has the option of either buying a new textbook or a used textbook. The used textbooks are less expensive than new textbooks. Suppose that the bookstore buys a used textbook for \$20 and sells it for \$40. Further suppose you have finished taking a course and wish to sell your used textbook. Instead of selling your textbook to the bookstore (for \$20), you approach a student (not a friend of yours) who will be taking the same course next year, and you offer to sell the student your used textbook. Assume that all used textbooks are of equal quality.”

They were then asked: “How much money do you ask for the used textbook you wish to sell?” They were also asked to give a brief explanation of their answer.

Results: The asking price ranged from \$20 (the same price they would get from selling the book to the bookstore) to \$40. Twenty-one students (out of thirty-three) chose an asking price of \$30 or lower. The mean average asking price was \$31.79. Explanations for their asking prices included comments such as, “I’d be helping someone out,” “Just to make it fair,” “The student is also getting a bargain,” and “The [other] student saves.”

Conclusion: In this setting, most subjects did not seek to maximize profits. Most of the students listed an asking price of \$30 or less. Many students commented on the effect of the price on the other student. The asking price was affected by considerations of fairness. Issues of fairness affect economic behavior.

3171

WHAT COLORED DYES ARE IN POWDERED DRINK MIXES AND COLORED MARKERS?

Steven Spector and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

I did this experiment to find out which colored dyes are used in powdered drink mixes and in colored marking pens. To separate the colors in one compound color, I needed filter paper and rubbing alcohol. After placing the filter paper, with the colored mark on it, in the rubbing alcohol for about 20 minutes, I noticed that in both the powdered drink mixes and markers, the darker colors had more colored dyes in them. However, the colors blue, yellow and red didn't change at all. This is because they are primary colors. Black, though, had almost every color I could think of in it. This told me that black is made up of every color.

3172

BUILDING A SET OF THREE PORTABLE COSMIC RAY DETECTORS FOR HIGH SCHOOL EXPERIMENTS

Arthur Altshiller, Robert Coutts, Dean Papadakis, Ken Mukai, Robert Baker, Richard Buck, Stephen Cooperman, Charles Wilken and Prof. Ryoichi Seki (mentor) (ryoichi.seki@csun.edu) — CSUN, Department of Physics Astronomy

A team of eight high school teachers associated with the project, California High School Cosmic Ray Observatory (CHICOS) (<http://www.chicos.caltech.edu>), and Matt Hielscher, a student of Van Nuys High School, have constructed a set of three Portable Cosmic Ray Detectors for use in high school experiments. We have followed the detector design created by Dr. Howard Matis of the Lawrence Berkeley Laboratory, shown at <http://www.lbl.gov/abc/cosmic/>, but because our photomultiplier tube, scintillator paddles, and specific component values differ from those in the original design, the box design and timing calibrations have been modified.

This project is intended to be a low-energy counterpart to the CHICOS project. Portable detectors will allow students to estimate the directional, altitude, and time-dependence of cosmic ray muons both inside and outside the classroom. The detectors are powered by a 12v source, allowing students to move the units around easily.

More than that, with the portable unit, we can show students how we can read the upper paddle and lower paddles separately and then together. The logic circuit that determines when the paddle strikes are coincidental. This is a demonstration that may allow a better understanding of the CHICOS unit for students in our estimation.

Procedure: After the parts were ordered, we worked mainly on Saturdays at Van Nuys High School in the Physics and adjoining rooms to solder the circuit boards, cut, sand and polish the

scintillator paddles, and assemble the detectors. Work sessions started in October 2002, and meetings were held on:

Thursday, October 10, 2002 at 4:00 pm;
Thursday, October 31, 2002 at 4:00 pm;
Tuesday, November 19, 2002 at 4:00 pm;
Saturday, December 07, 2002 at 12:00 pm;
Saturday, December 14, 2002 at 10:00 am;
Saturday, January 25, 2003 at 9:00 am;
Saturday, February 22, 2003 at 9:00 am;
Saturday, March 29, 2003 at 9:00 am;
Saturday, April 19, 2003 at 9:00 am; and (so far)
Saturday, May 10, 2003, at 9:00 am.

Most evening meetings were 2–3 hours, and most Saturday sessions were 4–5 hours, and there were many individual hours spent between sessions for research, getting supplies, and other project-related topics.

Several stages of production were identified. We ordered parts, prepared scintillator paddles, soldered the circuit board, and built the enclosure (including painting, drilling holes, assembling pieces, producing the Lucite panel for the front, and placing handles on them for easy carrying. The CHICOS name was also emblazoned on each.). Testing is still to be done as of this writing, although we powered up one unit at our April meeting after painstakingly identifying photomultiplier-tube (PMT) wires and circuit board jumper locations.

The scintillator paddles are thicker than those described in the Berkeley instructions. The photomultiplier tubes (PMTs) have a greater detector diameter than those in the Berkeley project or in the QuarkNet project (<http://hep.ps.uci.edu/quarknet>). The paddles were precision-shaped to new specifications. Sides of the paddles had to be sanded and polished to allow the best total internal reflection to catch the most cosmic ray light emissions appearing anywhere in the paddle. The tapered end of the paddle had to be specially shaped and lathed to accommodate the PMT. A special glue combination was mixed to join the PMT to the scintillator paddle without significant loss of signal from emissions. (These steps were assisted by Prof. Robert McKeown of CalTech, the Director of CHICOS.)

Initially, comparisons were made to a similar QuarkNet detector (<http://hep.ps.uci.edu/quarknet>) built last summer and shared among three teachers who had attended that project. That detector started to circulate to the different schools, but we should be able to see it again for circuit comparisons before summer break.

However, there are several differences between the QuarkNet detectors and the ones we are building. While the circuit boards are the same, not all components were available, so some substitutions were made, and this has meant that our base values for timing are different; on our first occasion, before adjustment, our timer circuit counted for 38 seconds, rather than 60. Because of the different thicknesses of the paddles and the sensitivity of the PMTs, counting frequencies are likely to be different from the QuarkNet detectors. One of the jobs still facing us will be to calibrate the three units with each other (or derive some standard proportional sensitivity con-

stant) so that a reading of "500 counts" on one unit can be interpreted as a difference in sensitivity and not a real difference in muon flux.

On firing up one circuit board during the April 19 session, only the rightmost counter counted, and the starting number (even when reset) was 400, indicating a segment problem. The upper paddle seemed to be working (counting), but the lower paddle was recording no events. Upon switching the leads, the lower paddle position worked fine when it counted the upper paddle events, indicating—perhaps—that the lower paddle wiring may be at fault.

At the May 10 session, the final soldering was completed. All three detectors have power now, and are close to the working condition. In the coming few weeks, the tuning and adjusting will be carried out at CSUN by a member of the technical staff of the Department of Physics and Astronomy, Jeff Batten, with help from the original designer, Dr. Howard Matis of the Lawrence Berkeley Laboratory.

3173

GOT GOLD FISH?

Megan Morris and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

My project explored the behavior of fifty goldfish under different environmental conditions. I observed the fish for one week under each of the following conditions: I decorated one side of the tank with rocks and plants and the other side was empty; I explored the effects of light on fish preference by placing light in one corner while the other end was dark; I experimented with the effects of magnets on fish behavior. My results showed that the fish preferred the decorative side of the tank, the light, and they tried to avoid the magnet.

3174

INVESTIGATION OF FACTORS INFLUENCING BLOOD PRESSURE AND HEART RATE

C. R. Rutherford and G. C. Zem (teacher). Ernest O. Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This study investigated the influence of everyday factors on heart rate and blood pressure. These factors included age, time of day, sleep, exercise, body position, and consumption of food, caffeine and alcohol. The project used a 13-year old male and a 54-year old male as test subjects. Blood pressure and heart rate were measured using an Omron wrist monitor. The average blood pressure of the 13-year old, 106/49 mm Hg, was less than the average blood pressure of the 54-year old at 119/69 mm/Hg. However, these numbers were subject to variation, with a ± 2 (or twice the standard deviation) of $\pm 17\%$ and $\pm 15\%$ respectively. Drinking alcohol had no effect on adult blood pressure, even though the medical literature reported that alcohol lowers blood pressure. Caffeine in Coke on the other hand did increase teenage blood pressure by about 13%

to 20%. However, caffeine in coffee had no effect on adult blood pressure. Exercise also had no significant effect on blood pressure. However, there were definite observable increases in heart rate as exertion increased. Surprisingly, the adult's heart rate leveled off at a lower level than that of the teenager for a given exertion level. Blood pressure dropped 20 to 40 mm Hg when the teenage subject was in bed, resting or asleep. Blood pressure is also known to rise with stress, fear, anger, etc. However, the authors had no means of initiating, controlling or measuring these factors. Therefore, these factors were not investigated.

3175

WHICH BATTERY LASTS LONGER?

Sairam Kumar and M. Simonds (teacher). Portola Middle School, 18720 Linnet St., Tarzana, CA 91356.

This study was to find out the best battery out of three batteries, which were Rite Aid Alkaline, Duracell Coppertop, and Energizer e2 Lithium Technology. The Gameboy Color device was used to test the life in hours lasted in the gameboy. It was found that the Lithium Battery lasted the longest, followed by the Duracell Coppertop and Rite Aid Alkaline. However, it has also been found that the most cost efficient is the Rite Aid Alkaline.

3176

DNA ISOLATION USING SOME COMMON KITCHEN MATERIALS

Karen Amaya, Leticia Arambula, Shirley Benitez, Andrea Buenrostro, Howard Castillo, Richard Cordova, Estefany Delgado, Ernest Jr. Estrada, James Guardado, Francisco Gutierrez, Starles Johnson, Dalia Leon, Jocelyn Martinez, Breonna Narcisse, Brian Negrete, Jaime Nunez, Judit Ochoa, Roy Padilla, Maria Penaloza, Luis Rangel, Alberto Rodrigues, Danny Saavedra, Maira Sanchez, Mishay Scruggs, Omar Silva, Paola Tirado, Luis Vaca, Leah Williams, and Ifeoma Odunze (teacher). Bethune Middle School, 155 W. 69th Street, Los Angeles, CA 90003.

The purpose of the investigation was to study the effectiveness of some common kitchen materials in DNA isolation, as our first step towards isolating and comparing DNA from various species of banana and onion—their fingerprints. We used a modified method of Ellen, Averill, 1993 and Adventures in Engineering and Science, 1998. A DNA isolating solution was prepared by adding 10 ml. of white or clear Sunlight liquid dish washing detergent (not ultra) and 10 grams of non-iodized salt to distilled water to make 100 ml of the solution. The detergent breaks apart the proteins in the membranes and the cell walls and the salt reduces the force of attraction between the DNA and protein. 5% meat tenderizer solution (enzyme) was also prepared, to denature the proteins that may contaminate the DNA. 40 grams of ripe banana were added to 80 ml. of the DNA isolating solution in a 100 ml. beaker and mashed with a clean plastic spoon. The mixture was filtered through a four-layer cheese cloth. 4 ml. of the meat tenderizer solution was added and the beaker was swirled for about 3 minutes. Each group of students got 5 ml. of the clear filtrate and an equal volume of ice. Cold 70% isopropyl alcohol was care-

fully poured down the side of the test tube containing the filtrate to form a layer on top. It was allowed to stand for 3 to 5 minutes and the unpurified DNA was removed carefully with a clean glass rod and dried. This method was also effective for onion and strawberry. Our investigation is on-going. Our next step is the DNA fingerprinting of isolated DNA from various species of banana and onion.

3177

HOW FAR WILL GERMS TRAVEL?

Stanley Luc and Mr. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

My experiment demonstrated the distance germs could travel when sneezing. A balloon filled with a handful of confetti demonstrated the sneeze; the balloons acting like the nose and the confetti as the germs. The sneeze itself was recreated by popping a balloon with the handful of confetti inside being blown away. The balloon would be placed in a large room where the confetti would be able to go its full distance after being blown out of the balloon. The balloon would be in the center of the room and there would be four circles made of chalk around the center place. Circles would be one foot away from each other starting at the center spot going outwards. The balloon in the center would then be popped with a pin and I would record the number of confetti pieces that would fall into each circle. This was repeated five times. The ring with the most confetti was the closest one, or the ring one foot away. Related into real life, when someone would sneeze, there would be a higher number of germs the closer you are to that person. Airborne germs from sneezing can go up to four feet or farther away. Germs can go in every direction and the farther you go outwards the germs would be more spread out so there would be less.

3178

IL-6 FAMILY OF CYTOKINES MESSENGER RNA ISOLATION IN ZEBRA FISH DEVELOPING STAGES EMBRYO

Janice Lee, Keren Kogan and C. Riley (teacher). El Camino Real High School, 5440 Valley Circle Blvd., Woodland Hills, CA 91367.

The purpose is to isolate messenger RNA in zebra fish developing stage mixed pool embryos. During the early developing stages of zebra fish embryo, our hypothesis is that specific complementary DNA sequences of messenger RR IL-6 Family of Cytokines are evident. Posttranslational polyadenylation is a common feature of the biogenesis of most eukaryotic messenger RNAs. Initial sizes of poly (A) tails are approximately 200 nucleotides in length. These long tails shorten during aging of messenger RNA to lengths of 40–60 adenylate residues. The poly (A) tails allow our research team to purify polyadenylated RNA species from non-polyadenylated RNA (ribosomal RNA and transfer RNA) in zebra fish developing stages embryo. The method

relies on base-pairing between the poly (A) residues at the 3' ends of the messenger RNA and biotin-labeled oligo (dT 20) probe, which itself can be used for immobilization on streptavidin solid supports. Non-adenylated RNA species are not bound and are easily washed off. The bound messenger RNA is eluted from the solid support by lowering the salt concentration. Immobilization of messenger RNA on streptavidin magnetic particles opens a convenient way for efficient isolation and purification of poly (A)-tailed IL-6 messenger RNA. Furthermore, the level of messenger RNAs expression can be assessed by comparing the change in complementary DNA sequence of developing stages embryo.

REFERENCES:

1. Amgen Home Page. 2000. Amgen: Messenger RNA Isolation. 24 April 2003 <www. amgen. com>
2. De Andres, B., del Pozo, V., Gallardo, S., de Arruda-Chavez, E., Cardaba, B., Martin Grozco, E., Posada, M., Palomino, P. and Lahoz, C. (1995) Improved Method for mRNA Extraction from Paraffin-Embedded Tissues. *BioTechniques* 18 (1): 42-43

3179

EFFECT OF DIFFERENT COLOR LIGHTS ON PLANT GROWTH

Sharib Gaffar and O. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of possible effect of color lights on plant growth. Plants were grown from yellow Mustard seeds to a reasonable height before the plant pots were placed in cardboard boxes. Every third day, 150 ml of water was added to each pot, and every fifth day they were measured. Results shower combination of green and red lights was most effective in Mustard plant growth. In the single light category, the red color was most effective.

3180

EFFECTS OF LANE "OIL" ON THE FRICTION BETWEEN A BOWLING BALL AND A BOWLING LANE

Michael Milan Rodriguez and Gregory Zem (teacher). Ernest Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

This study examined the role that lane "oil" plays in the amount of hook a bowling ball makes on a bowling lane. In order to reduce the variables involved, only plastic or urethane balls were used (these are less reactive to the lane conditions). Two lanes were oiled with equal units of lane conditioner—in other words, the oil pattern was identical except in length. One lane was oiled to 20 feet (an unusually short pattern) and the second lane was oiled to 40 feet (a fairly long pattern). Four respected bowlers threw a total of 100 shots in order to get enough data to compare. The bowlers were asked to choose a line (a place to stand and a mark on the lane) to shoot at, and regardless of the pin fall, asked not to adjust. The bowlers had a difficult time

keeping the bowling balls on the lane with 20 feet of oil and struggled to hit the pocket. Using plastic balls, the lane with 40 feet of oil often left the bowlers with shots that never reached the pocket. The author documented the difficulty with still pictures, video, and by standing out on the lane and physically noting where the ball started to hook. The author concluded that lane conditioner reduces friction between a bowling ball and a lane, and delays the hook to the pocket.

3181

WHEN TWO POTS ARE PLACED ON A STOVE, EACH WITH THE SAME AMOUNT OF WATER, BUT ONE WITH COLD AND ONE WITH HOT, WHICH ONE WILL BOIL FASTER?

Alexis Martin and Mrs. Shaw (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

During this experiment, two different water temperatures were tested. Two pots, each the same size and each containing the same amount of water, were placed on a stove with a medium flame. After several trials, it is clear that hot water boils faster than cold water. This is probably because hot water is closer to the temperature at which water boils.

3182

CONSTRUCTING AN ENERGY ANALYZER FOR AN ARGON PLASMA EXPERIMENT

Christine Cerniglia, Martha Pastuska, Tatiana Segrist, Robert Baker (mentor), and Richard Buck (mentor). Louisville High School, 22300 Mulholland Drive, Woodland Hills, CA 91364.

A probe for analyzing the energy profile of argon plasma can be constructed based on the following concepts. First, argon plasma energy can be measured by determining the kinetic energy of the individual particles (electrons and ions) or more easily through an energy profile of the particles. Dr. Walter Gekelman's lab at UCLA provides us the equipment to create plasma by ionizing argon gas at very low pressures (about 3×10^{-4} torr) using a Helicon RF source. Since the electrons in the plasma are moving at extremely high speeds and constitute a very small percentage by mass of the plasma, we are more interested in measuring the kinetic energy of the positively ionized particles (cations). The analyzer consists of three fine-mesh copper wire grids separated by a distance less than the Debye length of the plasma (less than 1.0 mm). The outside grid is a selector (biased negatively to repel electrons), the center grid enables a variable positive potential to be selected (allowing only cations of a sufficient energy to pass), and the inside grid is a collector (which senses the cations passing the variable grid). The inside grid will send information in the form of positive current flow to an oscilloscope. Data can be gathered relating the current flow to the variable grid potential. This should show a Gaussian distribution of

energies over the total sampling with the peak representing a median energy of the cations in the plasma.

3183

EFFECT OF TEMPERATURE ON ACIDITY

Peter Low and Ms. D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study was to prove or disprove my hypothesis that when the temperature was lowered the acidity of a solution increased. The pH of distilled water and lemon juice was constant, but the pH of vinegar changed from 3 to 3.5 during boiling. This suggests that temperature does affect the acidity of certain substances.

3184

MONITORING THE SOLAR WIND

Stephanie Cisneros, Johanna Mendoza, Lynelle Aniciete, and Robert Coutts (teacher). Van Nuys High School, 6535 Cedros Ave, Van Nuys, CA 91411.

We used sequenced photos accessed from the web site SOHO.gov to measure the speed of solar flares directly. Once we mastered this calculation method, we visited other web sites giving up-to-the minute speeds for solar protons, electrons and ions of various types. The ACE satellite and the Genesis satellite data flows are particularly helpful and straight-forward to deal with. We learned that there is considerable variation from the standard wind speed values, depending on the causes of these particle emissions from the Solar surface. This activity began our systematic study of the interaction processes between the Sun and Earth.

3185

OBSERVANCE OF VARIOUS DYES FOUND IN POWDERED DRINK MIX AND COLORED MARKER

S. A. Shen and G.C. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This chemical experiment analyzed the different pigments and dyes used in powdered drink mixes and colored markers. Set different colors of powdered drink mix (specifically, Kool-Aid) were mixed with water. One drop of each mixture was an 15 cm × 13 cm rectangles of filter paper each drop approximately two centimeters above the base of the filter paper. The identical procedure was utilized for six differently-colored markers; the only difference being the fact that dots of ink were directly applied to the filter paper rather than mixing the marker ink with water to form a concentrate. Each filter paper was labeled according to color and color type (i.e.

energies over the total sampling with the peak representing a median energy of the cations in the plasma.

3183

EFFECT OF TEMPERATURE ON ACIDITY

Peter Low and Ms. D. Shah (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This study was to prove or disprove my hypothesis that when the temperature was lowered the acidity of a solution increased. The pH of distilled water and lemon juice was constant, but the pH of vinegar changed from 3 to 3.5 during boiling. This suggests that temperature does affect the acidity of certain substances.

3184

MONITORING THE SOLAR WIND

Stephanie Cisneros, Johanna Mendoza, Lynelle Aniciete, and Robert Coutts (teacher). Van Nuys High School, 6535 Cedros Ave, Van Nuys, CA 91411.

We used sequenced photos accessed from the web site SOHO.gov to measure the speed of solar flares directly. Once we mastered this calculation method, we visited other web sites giving up-to-the minute speeds for solar protons, electrons and ions of various types. The ACE satellite and the Genesis satellite data flows are particularly helpful and straight-forward to deal with. We learned that there is considerable variation from the standard wind speed values, depending on the causes of these particle emissions from the Solar surface. This activity began our systematic study of the interaction processes between the Sun and Earth.

3185

OBSERVANCE OF VARIOUS DYES FOUND IN POWDERED DRINK MIX AND COLORED MARKER

S. A. Shen and G.C. Zem (teacher). Lawrence Middle School, 10100 Variel Avenue, Chatsworth, CA 91311.

This chemical experiment analyzed the different pigments and dyes used in powdered drink mixes and colored markers. Set different colors of powdered drink mix (specifically, Kool-Aid) were mixed with water. One drop of each mixture was an 15 cm × 13 cm rectangles of filter paper each drop approximately two centimeters above the base of the filter paper. The identical procedure was utilized for six differently-colored markers; the only difference being the fact that dots of ink were directly applied to the filter paper rather than mixing the marker ink with water to form a concentrate. Each filter paper was labeled according to color and color type (i.e.

orange: colored marker.) After each spot of color dried on the filter paper, each sheet was stapled into cylinders, with each dot of color formatted on the outside, and the cylinder itself measuring 15 cm in height. Each cylinder was placed into a jar filled one centimeter high with rubbing alcohol (specifically, a concentrate of 91% isopropyl alcohol and 8% water). Each of the twelve cylinders was placed in a jar for 15 to 20 minutes, and then removed and dried. This "mass" experiment was conducted three times, each time with the same methodical procedure and manner, producing products called "chromotograms." The results display the fact that more colored pigments are used in colored markers than powdered drink mixes, and the colors visible in each chromotogram usually showed the expected combinations of dyes that would compose the designated color. For example, in green, the majority of the colors used to create the ink or drink mix were yellow and blue; in orange, the colors exhibited were yellow and red. It was also observed that in the primary colors of red, yellow, and blue, the pigments coloring the substance would be only of its own color, as the primary colors cannot be created by any other color compounds. The main component dyes found in both the powdered drink mix and colored markers were blue and red, and each of these colors appeared at the top of all the chromotograms they were found in. This result therefore shows that the main pigments used in coloring include the primary colors, as they are widely used in many color compounds to form many different mixtures. The results also showed that darkest colors appear at the top of the chromotogram, the lighter colors at the bottom, so this leads to the conclusion that the darker colors are concentrated with more pigments, and as they spread up the filter paper, the lighter colors are displayed from the darker colors as the rubbing alcohol separates them, exhibiting an array at colors, the lightest and least concentrated at the bottom. The final color at the top would almost always be a primary color, and it is the final color with reason, as no more colors can be extracted from it. This also shows how colors are made; the darker primary colors act as a base to the desired color, and the lighter colors are added to achieve the final result.

3186

DOES FOOD STAY HOTTER AFTER BEING COOKED ON THE STOVE OR MICROWAVED?

Daniella Turenshine and M. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

This experiment tested whether the way food was prepared, on the microwave or the stove, affected the temperature of the food item. Different food items were prepared in the microwave and stove according to their directions. The temperature was then measured with a thermometer directly after it was cooked, one minute, 3 minutes, 5 minutes, and 10 minutes after. The three foods tested were Chef Boyardee Raviolis, Kraft Macaroni and Cheese, and Campbell's Chicken Noodle Soup and the experiment was repeated three times. Each food item proved that the appliance in which the food is prepared makes no difference on the temperature of the food.

3187

LOOK MA! NO LEAKS!

R.J. Lasky and G. Zem (teacher). Lawrence Middle School, 10100 Variel Ave., Chatsworth, CA 91311.

The purpose of this project was to discover which disposable diaper holds the most liquid. The study began with an interview of four new mothers who were asked which brand of disposable diapers they thought held the most liquid. One mother said Huggies, two said Pampers, and one said they all held the same. I used those three brands of disposable diapers and poured equal amounts of warm water on each diaper. The results were graphed and compared. Overall, Pampers Premium held the most liquid.

3188

DOES ADOLESCENCE AFFECT A PERSON'S ABILITY TO MEMORIZE?

Esperanza Ibarra, Victoria Martinez, and Aulikki Flagan (teacher). Ramona Convent Secondary School, 1701 West Ramona Rd., Alhambra, CA 91803.

Are adolescent women more receptive to different types of music or pictures? Our experiment consisted of two small types of tests. The ages we experimented with were from 14–18. The first test consisted of having to memorize ten pictures in two minutes. They were given one minute and a half to draw the pictures on paper not having to be in order or with detail. The second half of our experiment consisted of giving the group of females one minute to memorize 10 words, and a minute to write them down, each time with a different type of music genre playing. Our results showed that the women remembered pictures that were more feminine and the females also memorized better with the songs playing in the background they were not familiar with or did not know the words to.

3189

SOLAR ANIMATION PROJECT

Jennifer Cho, Jennie Bae, and Robert Coutts (teacher). Van Nuys High School, 6535 Cedros Ave., Van Nuys, CA 91411.

Two Honors Physics Classes and one Medical Magnet Senior Biotechnology class assisted Jennifer and Jennie in collecting 8 months worth of three different wavelength pictures of the Solar surface from the SOHO web site. These pictures were organized into monthly folders and then animated, so as to examine the dynamic changes occurring on the Solar surface and in the corona. These animations are now available for the world to see on our web site. We are using them to familiarize ourselves with Solar surface properties in light of our knowledge of magnetic and electric field properties.

3190

CLIMATE

Martha Aguilar, Jennifer Guzman, Brenda Mendoza, Jackie Ockene Fogelman (teacher), and Wendy Mayea (teacher). Olive Vista Middle School, 14600 Tyler Street, Sylmar, CA 91342.

Our group researched climate. Our hypothesis was that it is colder in the San Gabriel Mountains than it is in the San Fernando Valley because the sun is closer to the mountains. We researched our hypothesis and found that the higher you go into the mountains, the air gets thicker and colder. The air gets thinner the lower you go in the mountains. We also took a trip to the San Gabriel Mountains and confirmed that by taking the temperature in the higher altitudes, where the colder climate was. Our results did not support our hypothesis.

3191

GEOGRAPHIC DISTRIBUTION OF THE AURORAL OVAL

Timmy Kang, Cynthia Kim, Eric Dindji, Andrew Hirako, Edson Hernandez, Emily Pelacios, and Robert Coutts (teacher). Van Nuys High School, 6535 Cedros Ave., Van Nuys, CA 91411.

We visited a Space Environment Center (SEC) web site to acquire sequenced pictographs of the Auroral Oval surrounding the North Pole. Students displayed detailed maps of the Northern Hemisphere at the same time they viewed the hourly pictures of the Auroral Oval, enabling them to precisely locate the Southern and Northern extent of the oval over North America. Examining several weeks worth of data over three observational days enabled the students to see considerable travel northward and southward of the oval's edge. This knowledge enabled us to coordinate severe solar activity with variation in responding Auroral activity. We also monitored total energy flux throughout the entire oval.

3192

WHAT IS THE EFFECT OF FRUIT ENZYMES ON THE SOLIDIFICATION OF GELATIN?

Jonathan Ko and Mrs. Simonds (teacher). Portola Middle School, 18720 Linnet Street, Tarzana, CA 91356.

In my project I put fruit into cups of gelatin to test if the enzymes within the fruit had any effect in the solidification of the gelatin. At first I hypothesized that the papaya and pineapple enzymes would prevent the solidification of the gelatin. It turned out that the pineapple and kiwi had enzymes that would prevent solidification of gelatin. The other two fruits (strawberry and papaya) had no effect on the gelatin.

3193

A BI-DIRECTION STUDY ON THE EFFECTS OF NUTRITION AND POPULATION DENSITY IN *BRASSICA RAPA*

J. Nameth, K. Evangelista, N. Klebanov, I. Shklyar, J. Ball, B. Young, J. Pai, A. Chu, N. Polizos, L. Ben-Ari, L. Moran, A. Borruel, A. Serber, R. Hovivian, M. Hollander, A. Jahanbin, W. Sotelo, J. Gutierrez, D. M. McDonnell (teacher). Sherman Oaks Center for Enriched Studies, 18605 Erwin St., Tarzana, CA 93015.

The purpose of the study was to evaluate the individual and combined effects of nutrition and population density and how they affect the phenotypic expression in *Brassica rapa*. Fertilizer pellets containing Nitrogen, Phosphorus, and Potassium were ground and then added to one-liter volumes to make the increasing concentrations of 1x, 2x, 4x, 8x, and finally 16x. Fertilizer solution was added to each seedling in 2ml volumes at 5-day intervals. Four other trials were set up at the same time. Each trial used the same nutrition regime. Each trial differed in the amount of seedlings that were sowed and maintained throughout the experiment. The population densities varied from 1 plant per canister in the first trial, to two plants per canister in the second trail, increasing the number of plants in each trial by a factor of two (2-4-8-16 plants per trial). Observations and measurements were taken daily. Among the observations two phenotypic expressions stood out. As the concentration of fertilizer was increased the expression of anthocyanin was decreased. This effect was most pronounced when plant stocks were used that normally produce a large concentration of anthocyanin. The other phenotypic expression that was affected to a great degree was overall plant height. While not as clear it seems that there is an upper and lower tolerance limit with an optimum of 8x. A new study is being designed to quantify the expression of anthocyanin in various plant tissues.

3194

THE EFFECT OF VARYING SODIUM CHLORIDE CONCENTRATIONS ON SEA URCHIN FERTILIZATION

Eric Albarran, Bryan Aquino, Vanessa Arias, Christian Avina, Crystal Ayala, Joanna Belloso, Elia Berumen, Joaquin Bon, Jimmy Castillo, Laura Castellon, Roberto Cortez, Jesse Cuevas, Stephanie De Castro, Jose Elenes, Ana Estrada, Cynthia Felix, Cristopher Galdamez, Jesus Gallegos, Alfredo Garcia, Carlos Garcia, Christopher Garcia, Irma Hermoso, Cristina Itzep, Lourdes Luviano, Adriana Mendoza, Daniel, Mercedo, Jose Meza, Kevin Miranda, Shabee Naqvi, Cindi Orellana, Dyan Pascua, Karina Perez, Roberto Quintanilla, Edgardo Rodriguez, Adriana Sandoval, Tomasa Ser-rano, Julia Sullivan, Hao, Duc Tran, Johanna Sanchez, David Vera and Nandita Pat (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

The salinity of the ocean water varies with its depth and location. The waters of Antarctica are saltier than those of the Atlantic Ocean. We were interested to find out how the varying salt concentration may affect marine life. In these studies we have used the purple sea urchin *Strongylocentrotus purpuratus*. We were interested to find out whether varying the sodium chloride con-

tent of artificial sea water (ASW) would affect sea urchin fertilization. ASW normally contains 0.445M Sodium Chloride (NaCl). We tested five solutions containing 0.106M, 0.212M, 0.318M, 0.63M and 0.85M NaCl. We suspended the eggs in ASW and added it to a petri dish, which contained either ASW or modified ASW. Then we added the sperm and observed them under the microscope and noted the time required for fertilization. We repeated the experiment 3 times. Our results show that on an average the control eggs were fertilized in 3.9 minutes. In 0.318M NaCl the eggs were fertilized in 3.8 minutes. At lower concentrations of NaCl (0.212M and 0.106M) only 56% of the eggs were fertilized in 6 minutes. A slightly higher concentration of NaCl (0.63) did not affect sea urchin fertilization. When we went to higher concentrations (.85M) the eggs were damaged and no fertilization was observed. We used probes to measure the salinity of our experimental artificial seawaters. Our results indicate that lower and higher salt concentrations are detrimental to sea urchin fertilization.

3195

THE USE OF THE MICROBIAL LAVA LAMP TO TEST THE EFFECT OF VARIOUS TEMPERATURES AND SUGAR CONCENTRATIONS ON YEAST RESPIRATION

N. Acevedo, M. Callahan, N. Camunas, Y. Carrillo, S. Castillo, V. Chavez, A. Chen, S. De Vera, K. Enright, M. Espejel, K. Estrada-Ugalde, Y. Galvan, M. Garcia, K. Gatus, J. Hernandez, J. Hernandez, K. Hernandez, D. Jacinto, J. Kailany, C. Lam, P. Lee, C. Lujan, J. Mendez, A. Mercado, R. Miramontes, V. Navid, L. Polanco, A. Ponce, L. Rivera, J. Roman, B. Salazar, I. Salazar, L. Sloan, V. Teong, K. Tracy, M. Velasquez, M. Villasenor, and M. Diaz (teacher). Ramona Convent Secondary School, 1701 West Ramona Road, Alhambra, CA 91803.

The purpose of this investigation was to learn about the scientific method by conducting experiments using the microbial lava lamp (MLL) to observe yeast respiration. One of the products of yeast respiration is carbon dioxide gas and it was measured by using a bubble counter on the MLL. The purpose was to find out under what conditions the yeast respired most rapidly. As a class we conducted two sets of experiments, one that tested the effect of temperature on yeast respiration and the other that tested the effect of various sugar concentrations on yeast respiration. We hypothesized that yeast respiration would be more rapid at 41–46°C because that is the temperature needed to activate the yeast when yeast beads are prepared. We conducted three trials of four water bottles containing yeast beads made with 1.0g of fast rising yeast (*Saccharomyces cerevisiae* by Bakipan), 30 mL of alginate solution and imbedded in glass powder, at different temperatures, controlling for sugar concentration, bead size and color. We tested the MLL at four temperatures, one at 0°C, one at 25°C, one at 41–46°C and one at 100°C. Our results showed that there was more rapid yeast respiration at 41–46°C and that at 100°C the water began to boil and we could not collect data. For our experiment on sugar concentration we hypothesized that if yeast respired with a 1% sugar solution then it would respire more rapidly with a 2% sugar solution and less rapidly with a 0.5% sugar solution. We also conducted three trials of four water bottles containing yeast beads made of with 1.0g of fast rising yeast (*Saccharomyces cerevisiae* by Bakipan), 30 ml, of alginate solution and imbedded in glass powder, in different sugar substitute solutions, and studied them under the same conditions. We controlled for

temperature, bead size and color. Our results showed that yeast respiration was more rapid in the 1% solution and less in the 2% and 0.5% sugar solutions. In conclusion yeast respiration occurs most rapidly at 41–46°C and in a 1% sugar solution. For further research we would like to test MLL in temperatures lower than 100°C but higher than 46°C and see if those conditions would yield higher rates of respiration. We would also like to test if different types of sugars and/or sugar substitutes would affect the rate of yeast respiration.

3196

THE ABUNDANCE OF LEFT- AND RIGHT-EYED CALIFORNIA HALIBUTS, *PARALICHTHYS CALIFORNICUS*, IN SAN PEDRO BAY

Jane Shin, Dominique Evans-Bye (teacher). Clark Magnet High School, 4747 New York Avenue, La Crescenta, CA 91214.

The California halibut, *Paralichthys californicus*, was studied to determine the abundance of either right- or left-eyed fish in the San Pedro area. Using the RV *Yellowfin*, an otter trawl was deployed to collect fish from the sea floor at two locations. One trawl was made inside the Los Angeles Harbor, and one off White's Point, San Pedro. Five California halibut were captured. The results were that four of the fish had their eyes located on the left side, while only one had its eyes located on the right. This implies that off the San Pedro coast, the abundance of left-eyed California halibut is higher than the right-eyed fish. A much larger sample size would be needed to confirm this conclusion.

3197

DOES UV RADIATION DAMAGE DNA?

Irina Hermoso and Nandita Pal (teacher). Robert Fulton Middle School, 7477 Kester Avenue, Van Nuys, CA 91405.

Global warming will result in a decrease in the ozone layer resulting in an increase in UV radiation. Small amounts of UV radiation are beneficial for humans, but a prolonged exposure may result in skin cancer. We were interested to find out whether UV radiation would break up and damage DNA. In order to do this we used a double-stranded circular DNA Plasmid (pUC19) and exposed it to UV light for up to 60 minutes. We took out samples of DNA at 0 minute, 5 minutes, 15 minutes, 30 minutes, and 60 minutes of exposure respectively. Then we ran an agarose gel electrophoresis on these samples to determine whether the DNA was broken down. Our results show that UV exposure breaks down the plasmid DNA whereas UV un-exposed plasmid DNA remains intact.

3198

**POPULATION DYNAMICS OF *ZANIOLEPIS LATIPINNIS* BY DEPTH
IN THE SAN PEDRO BAY**

Lilit Abramyan and Dominique Evans-Bye (teacher). Clark Magnet High School, 4747 New York Avenue, La Crescenta, CA 91214.

The organism studied was the *Zaniolepis latipinnis* or the Longspine Combfish. The hypothesis tested was that if otter trawl samples were taken from depths ranging from 37 meters to 201 meters, then most *Z. latipinnis* would be found at the intermediate depths. Data was collected by otter trawl off the RV *Vantuna* in the San Pedro Bight in July and November of 2002 at depths of 47, 67 and 74 meters. One-hundred and twenty five *Z. latipinnis* were collected from the 74 meter trawl, 25 from the 67 meter trawl and 15 from the 47 meter trawl. From this data, the abundance of *Z. latipinnis* increases exponentially as trawl depth increases. To further test this hypothesis, more trawls need to be taken from the greater depth ranges of known of *Z. latipinnis* habitat.

3199

COMMON HOUSEHOLD CHEMICALS AND BUFFERING EFFECT

Vanessa Andre, Sara Almasian and Ms. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

We attempted to neutralize borax, hydrogen peroxide, upholstery cleaner, and bleach, all 3% solutions, by diluting them with water to see if any of these cleaning products were good buffering agents. We first measured the pH of 10 ml of the chemicals and then began diluting them with water, 10 ml at a time, until the neutral pH was reached. The borax solution and upholstery cleaner proved to be very strong buffers and the hydrogen peroxide proved to be a weaker one. The borax solution (pH of 8.3) needed 660 ml of water until the pH of 7 was reached while hydrogen peroxide needed only 10 ml of water. Thus, borax is an appropriate choice for a detergent, since the pH does not change easily, even in a large amount of water.

3200

WHAT IS THE BEST LIQUID TO GROW YOUR PLANTS?

Nicole Gargano, Stacey Rauen, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

The purpose of this experiment was to decide if the rumors were true about how it is best to water your plants with water. So, we decided to test various liquids on sprouting Sweet William seeds. We took five petri dishes, covered the bottoms with paper towel, added 5 seeds on each, and watered the seeds with different liquids; water, carbonated water, Coke, orange

juice, or balsamic vinegar. We proved our hypothesis, which was that the seeds given pure water would grow the best. The seeds that received carbonated water grew fairly well, but not as well as the seeds given regular water. The seeds given Coke and orange juice did not grow and became moldy, and the seeds that received balsamic vinegar did not grow at all.

3201

EFFECTS OF CLEANING AGENTS ON TAR

D.A. Edelberg and G.C. Zem (teacher). Lawrence Middle School, 101 00 Variel Ave, Chatsworth, CA 91311.

This experiment studied the question of which cleaning agent removes tar the best from a variety of materials. An equal amount of tar was applied to each material. All removal methods were applied to separate material and one was left as control. The experiment was repeated 2 times. The petroleum jelly smeared the tar on the carpet without removing it. The petroleum jelly had no effect on the rubber latex. The petroleum jelly had no effect on the nylon. The petroleum jelly smeared the tar on the cotton without removing it. The petroleum jelly had no effect on the foam rubber. The hydrogen peroxide had no effect on the rubber latex. The hydrogen peroxide had no effect on the nylon. The hydrogen peroxide had no effect on the foam rubber. The hydrogen peroxide had no effect on the cotton. The hydrogen peroxide had no effect on the carpet. The Spray 'N Wash left the carpet spotted. The Spray 'N Wash had no effect on the cotton. The Spray 'N Wash had no effect on the nylon. The Spray 'N Wash had no effect on the rubber latex. The Spray 'N Wash removed 15% tar off the foam rubber. The Goo Gone removed all but the stain from the rubber latex. The Goo Gone removed 97% of the tar from the foam rubber. The Goo Gone removed 20% of the tar from the carpet. The Goo Gone removed 50% of the tar from the nylon. The Goo Gone removed all but the stain from the cotton. The Wisk removed all but the stain from the cotton. The Wisk removed all but the stain from the nylon. The Wisk had no effect on the foam rubber. The Wisk removed 100% tar from the carpet. The Wisk had no effect on the rubber latex. The paint thinner had no effect on the rubber latex. The paint thinner removed 97% tar from the carpet. The paint thinner removed 97% tar from the foam rubber. The paint thinner removed 50% tar from the cotton. The paint thinner removed 100% tar from the nylon. The results point to Wisk being the best removal method for the carpet, paint thinner being the best removal method for nylon and cotton, Goo Gone being the best removal method for the rubber latex and the foam rubber.

3202

ABUNDANCE OF THE LIZARDFISH, *SYNODUS LUCIOCEPS*, OFF THE LA HARBOR

Nadia El-Fakih and Dominique Evans-Bye (teacher). Clark Magnet High School, 4747 New York Avenue, La Crescenta, CA 91214.

To determine in which month the lizardfish is most abundant and what impact water temperature has on its population dynamics, data collections were carried out off the LA Harbor on October 28, 2003. Data was collected using an otter trawl and a YSI to measure water temperature aboard the RV *Yellowfin*. The general method of performing these studies consisted of steering the *Yellowfin* out into the LA Harbor, deploying the otter trawl after determining the water temperature in the given region, and raising the net to tally the number of fish collected. To record the monthly abundance of the fish, this experiment would have to be repeated each month and several times each month, so as to record the abundance in varying water temperatures.

Data extended off the Oxy website collections from an accumulation of statistics of the years 1998–2002 off Harbor #1 prove October to be the month with the greatest abundance of fish. This data is significant in comparison to successive months in which few or no lizardfish were found. A statistical analysis of the collected data was carried out using a quadratic regression with the formula: $y = aX^4 + bX^3 + cx^2 + e$, if $a = -.1040$, $b = 2.4059$, $c = -16.9748$, $d = 40.2727$, and $e = -16.0101$. This yielded a fit of $R^2 = .8071$ to the curve. This indicated a strong correlation between the quadratic function on the month number and the number of fish found, depicting the probability that similar results will be obtained in successive experimentations. *Synodus lucioceps* normally reside from Guaymas, Mexico, to San Francisco, California, but are not particularly common north of Pt. Conception. It can therefore be concluded that they prefer warmer water temperatures and reside in subtropical climates (from 34° – 22° N).

3203

EFFECT OF SUGAR SUBSTITUTES ON YEAST RESPIRATION IN THE MICROBIAL LAVA LAMP

M. Callahan, D. Jacinto, and M. Diaz (teacher). Ramona Convent Secondary School, 1701 West Ramona Road, Alhambra, CA 91803.

Experiments using the microbial lava lamp (MLL) were developed to determine if sugar substitutes such as Aspartame, Splenda, and Stevia, had the same effect as sugar on yeast respiration. The hypothesis was that if yeast requires sugar for respiration and Aspartame, Splenda, and Stevia do not contain sugar, then yeast respiration should not occur in those MLL. Two trials of four water bottles, containing yeast beads made of with 1.0-g of fast rising yeast (*Saccharomyces cerevisiae* by Bakipan), 30 mL of alginate solution and imbedded in glass powder, in different sugar substitute solutions were studied under the same conditions. Yeast respiration

was measured by counting the number of carbon dioxide bubbles for five minutes after respiration began. The results showed that the control, the MLL with sugar, produced 109 bubbles of carbon dioxide per minute. Aspartame produced 60 bubbles per minute, Splenda produced 49 bubbles per minute and for Stevia the carbon dioxide production was zero. Our results support our hypothesis for Stevia but our hypothesis for Aspartame and Splenda was not correct. Upon further research it was discovered that Splenda is made from real sugar (sucralose), Aspartame contains a small percentage of sugar and Stevia is a product of a natural herb that does not contain any sugar or sugar derivatives, which supports the results of our experiment. Further research needs to be conducted to determine if Stevia prevents yeast respiration alone or does it somehow kill the yeast.

3204

THE GROWING OF PLANTS WITH DIFFERENT CONCENTRATIONS OF FERTILIZERS

Brenda Molgora, Jessica Galindo, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

The purpose for doing this experiment was to find out which concentration would work best. We placed five turnip seeds in a petri dish and added three different kinds of fertilizer: plant food powder, plant food sticks, and rose and flower care. For each we put 0.1, 1.0, and 3.0 concentration. Then we mixed and dissolved the fertilizers in water. Our results were that 1.0 concentration of any fertilizer worked best. In conclusion, we learned that you shouldn't add too much fertilizer because it will destroy the plant, and not to put too little because it won't do anything for the plant and it won't grow. We recommend that it would be best to use the spikes when growing plants. This experiment is easy and has fast results so I recommend it to anyone to try it out.

3205

LIGHT'S EFFECT ON PLANT GROWTH

Rebecca Arroyo, Veronica Pedroza, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

We proposed our question of, "Would plants grow without the sunlight?" We then took on the challenge of experimenting with the question. We dug out previously planted Nasturtium (*Tropaeolum majus*), and replanted them. We carefully watered and cared for them for a week and a half. We then constructed two boxes and made holes in the side of one and a hole on the top of the other. Taking the data every day during science class, we have come to find that the plants started growing towards the light. In conclusion to this experiment, we have found that plants are truly dependent on sunlight and would start growing in the direction of the incoming light.

3206

RELATIONSHIP OF CHLOROPHYLL CONCENTRATION TO THE SIZE OF LONGSPINE COMBFISH, *Zaniolepis latipinnis*, IN SAN PEDRO BAY, CALIFORNIA

Constanza Hwang and Dominique Evans-Bye (teacher). Clark Magnet High School, 4747 New York Avenue, La Crescenta, CA 91214.

In this study, I compared the concentration of chlorophyll a (chl a) in the water to the size (length) of the longspine combfish, *Zaniolepis latipinnis*, collected through trawls in the in San Pedro Bay, to determine if the chl a concentration was related to the size of the organism. I utilized the SBE 25 Sealogger CTD to find the concentration of chlorophyll a. I used an otter trawl to collect organisms. All the *Z. latipinnis* were sorted out and measured (in centimeters). Measurements the chl a and the sizes of the *Z. latipinnis* were made twice, at about the same location, off White's Point, and time of year, but exactly two years apart. The results showed that the fish were slightly larger when the concentration of chl a was greater, while all other characteristics of water were about the same. Such evidence suggests that the concentration level of chl may have an effect on the growth of *Z. latipinnis*. However, since my observations were limited to the analysis of water quality and fish size over only two days, further study is needed to prove the accuracy and precision of my conclusion.

3207

DOES FERTILIZER MAKE THE SOIL ACIDIC?

Jaqueline Candelaria, Sydney Acevedo, and Ms. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

The purpose of this project was to see if a small amount of fertilizer mixed with soil has any effect on the pH of the soil. To do so, we tested the pH of a spoonful of soil mixed with 5 ml of water, before adding the fertilizer. The pH was found to be 7.0. Then we mixed the soil on the same spot with spoonful of fertilizer and waited for a day. The next day the pH was found to be 6.0. The results were that soil with fertilizer had more acid than the regular soil.

3208

DOES ACID OR BASE HAVE ANY EFFECT ON THE FORMATION OF CRYSTALS?

Emma Birur, Jamie Dela Cruz, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

The purpose of this experiment was to find out if acidic or basic conditions have any effect on the formation of crystals. We prepared several solutions with varying amounts of acids and bases. We started with 9 cups filled with 100 ml of water. The first cup received 2 drops of concentrated HCl. The second cup 4 drops, the third 6 drops and the fourth cup received 8 drops of acid. The cups 5–8 received 2, 4, 6, and 8 drops of sodium hydroxide, respectively. The last cup with pure water served as a control. Then we added a spoonful of table salt into each cup and mixed until the salt dissolved. We took a drop of each solution and spread it on to a glass plate. We heated the plates slightly to dry them and examined the crystals under a microscope. The higher concentrations of acid produced bigger crystals. Base had no effect on the formation of crystals when compared to the crystals grown in pure water.

3209

MOLD

Danielle Galicia, Ophelia Ngai, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

Our purpose of the project was to prove whether wet bread or dry bread would mold faster. We also wanted to see if it depended on whether the bread is in paper or plastic, and if light makes a difference. We separated the bread into groups. One group consists of wet bread in both plastic and paper bags. The other group consisted of dry bread in both plastic and paper bags. We then duplicated each group and placed one on a light surface and the other on a dark surface. After doing this project we learned that mold grows faster on wet breads in plastic containers and on light surfaces.

3210

COLORED GRASS

Kimberly Valesquez, Karina Bourenane, and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803.

The purpose of this experiment was to see the effect food coloring would have on the growth and color of the plants. The procedure which we used started with cutting paper towels to be used instead of soil. We then placed seven grass seeds into each petri dish. Next we added 6mL of colored water. (All different colors added). Finally we waited for the results. Within three

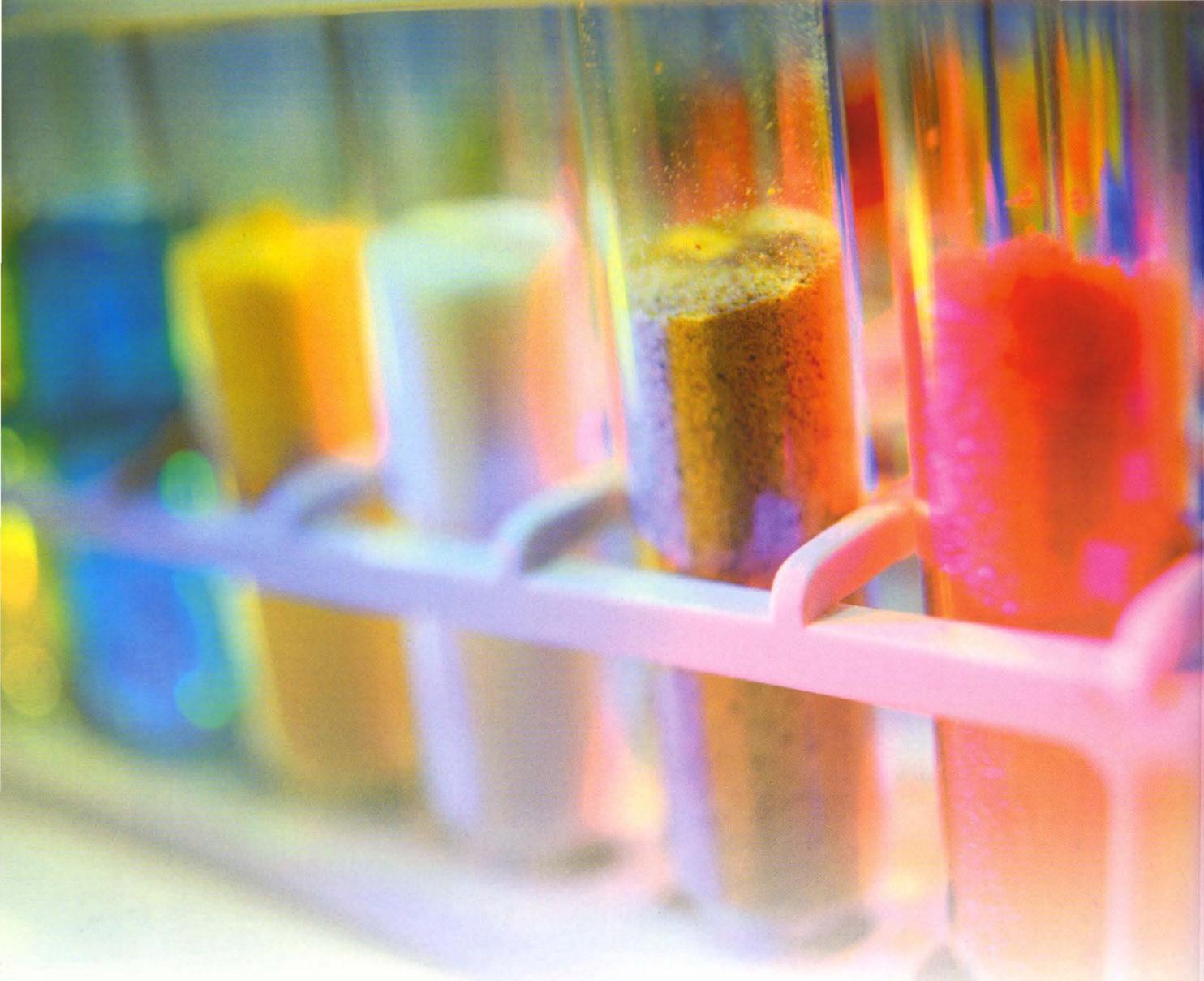
weeks, our results were in and clear. We had found that our hypothesis was precise. The grass had grew at a normal rate, and the grass had a dark tint of their artificial coloring.

3211

DOES THE pH AFFECT THE GERMINATION OF PLANTS?

Helene Lam, Jacqline Warner and A. Flagan (teacher). Ramona Convent Secondary School, 1701 W. Ramona Road, Alhambra, CA 91803

We examined the effects of pH on the germination of flower seeds. We took 10 petri dishes and numbered them from 1 to 10 with a permanent marker. We cut 10 round circles out of the sheet of paper towel to put at the bottom of each Petri dish and placed 4 Sweet William seeds in each dish. One dish received 10 ml of fresh water. Others received 10 ml of acidic or basic water with the following pHs: 2, 4, 5, 6, 8, 9, 10, 12. Different amounts of acid were added to each test tube to get the first 10 pH colors. After 2 days the seeds in pHs 6, 7, 8, 9 had all sprouted. After 6 days, only 1 or 2 seeds sprouted in the lower pHs.



PEARSON
Education

ISBN 0-536-81847-9

9 780536 818478 90000