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## Science fair winners studied orchids, apes, sea probes, language:[1 2 7 Edition]

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**Full Text** (1172 words)

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Head varies | Editions vary | Caption varies | For chart, unavailable online, see microfilm.

While most San Diego Zoo visitors may stop and watch the lowland gorillas for just a minute or two, Blair Beverly patiently stayed and eyeballed them for an hour at a time.

The La Jolla High School sophomore checked the location of each gorilla every three minutes and took notes on what they were doing. Visiting eight times over more than two months, Blair wanted to determine how the gorillas react to the absence of their alpha male, a silverback named Memba.

His project was among those taking top honors at the 46th annual Greater San Diego Science & Engineering Fair, which runs through tomorrow at the Balboa Park Activity Center.

Blair discovered that the eight other lowland gorillas in the zoo's troop tend to move out of public view on days when when Memba is removed from the exhibit. The juveniles didn't socialize with one another quite as much, he said, but a mother spent a little more time touching her infant.

He speculates that the absence of a silverback, who lays down the law for the rest of a troop on anything from where they gather in their enclosure to when they rest, may be stressful for the others.

"Having him around is security," said Blair, who had done two previous projects involving gorillas. "You'd feel comfortable."

Blair, who won a senior-division sweepstakes award for life sciences, will get to present his project in the International Science and Engineering Fair in Detroit next month.

Judges at the science fair also gave senior-division sweepstakes awards -- the top prizes in the competition -- for a prototype of a low-cost undersea probe, a computer program that "reads" stories and DNA testing on wild orchids. Each sweepstakes award carries a \$2,000 college scholarship from the Reuben H. Fleet Science Center and an additional prize.

More than 940 seventh- through 12th-grade exhibitors are participating in the fair. Major

sponsors include The San Diego Union-Tribune, Qualcomm, the County Water Authority, the Reuben H. Fleet Science Center, the Kiwanis Club of San Diego, the Taiwanese American Foundation of San Diego, the Biomedical Research Institute of America and the Price-Weingart Fund of the San Diego Foundation.

Most of the top winners, interviewed yesterday at the fair, said their projects focused on subjects they had been interested in for a long time. And, in a sign that the fair has succeeded in one of its chief goals -- providing the kind of support that motivates students to learn about science and engineering -- most already have plans to advance their own research with additional work.

Making the trip to Detroit with Blair is Francis Song, another La Jolla High sophomore. Francis won a sweepstakes award in physical science for work on a computer program designed to draw inferences from stories written in English.

Using Prolog, a computer language commonly used in artificial intelligence, Francis said his program uses a database of facts and rules to carry written material through a series of steps ending with a semantic analysis: a diagram of the sentence similar to those practiced by students in English classes.

That's where Francis' work stops for now. The next step, he said, will be to write a bigger program that "can take natural language and do something with it."

"One of the more immediate applications might be to have a computer solve math problems written in English," Francis said.

A more advanced version, he said, might improve on the Internet search engines and rudimentary question-and-answer systems in use today.

Arietta Fleming-Davies took a sweepstakes award in life sciences for an analysis of genetic variation in a native orchid species designated *Epipactis gigantea*.

It may sound esoteric, but the Bonita Vista High senior broke ground with a finding that the orchids reproduce in a fashion that increases the plant's chances of survival as a separate species.

Arietta took samples from two of the three known San Diego County locations for the orchid: Mission Trails Park and Noble Canyon in the Cleveland National Forest.

Using the same DNA fingerprinting technique used in forensic science, Arietta identified short segments of DNA from cells in the leaves of the plants. She found a lot of genetic variation in the DNA, an indication the plants are reproducing sexually -- "usually a good thing for the long-term survival of the plants."

Arietta started her project last year but was having trouble with the DNA analysis technology.

"I really liked the idea of orchids, and I liked the idea of doing a project out in the field," said Arietta, who won a \$2,500 prize from the Biomedical Research Institute in addition to

the scholarship.

Brian Fulkerson, a senior at Mt. Miguel High, designed and assembled an off-the-shelf deep-sea inspection vehicle, a remote-controlled device he hopes will be particularly valuable to marine science. It got him a sweepstakes award for physical sciences and a trip to Taiwan from the Taiwanese American Foundation of San Diego.

While working an internship at Oceaneering Technologies at North Island Naval Air Station, "I realized that (remotely operated vehicles) were big and very expensive," Brian said.

"So I decided to try to make a smaller and cheaper one using readily available technology.

"I've always been taking apart computers and phones and things like that. Now I had a chance to put something together."

Brian's vehicle, connected by a tether to a pair of joysticks, takes up about a cubic foot of space and cost him less than \$3,000. (Labor for machining some of the equipment was donated; Brian figures that would've added \$1,000 or so.)

It uses a small video camera for viewing and has two lamps but, unlike its larger cousins, it is not designed to grab or retrieve anything.

So far, it seems to work.

"I put it in the pool once -- banged it up against the side and bent one of the thrusters -- but other than that it's working great," he said.

Next step: a real deep-sea test to see if it operates at or even below its design depth of 150 feet.

### **[Illustration]**

4 PICS | 1 CHART; Caption: 1. Language probed: Francis Song, a 10th-grader at La Jolla High, won first place and a sweepstakes award for his study on language analysis. (B-10:7; B-5:2) 2. Gorilla habits charted: Blair Beverly, a La Jolla High 10th-grader, won for his study of gorillas. (B-10:7; B-5:2) 3. Studied orchids: Among the awards won by Arietta Fleming-Davies, a 12th-grader at Bonita Vista High School, were first place in her category and a sweepstakes award for her research on orchid reproduction. (B-10:7; B-13:1; B-5:2) 4. Used off-the-shelf technology: Among the awards won by Mt. Miguel High 12th-grader Brian Fulkerson was a sweepstakes award for his small deep-sea inspection vehicle. (B-10:7; B-5:2) 5. If you go -- Details on the 46th annual Greater San Diego Science & Engineering fair (B-10:7; B-13:1); Credit: 1,2,3,4. PEGGY PEATTIE / Union-Tribune photos 5. UNION- TRIBUNE

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