

# Taking the world by Storm . . . and Shaun

*Australian students lead the world in solving one of Earth's greatest environmental challenges*

It seems the future of bio-diesel production is in safe hands, if research conducted by two of the 2008 BHP Billiton Science Award winners is anything to go by.

Less than six months after the awards were announced, Queensland's Shaun Williams and Storm Holwill from Marist Regional College in Burnie, Tasmania, have won international recognition for their innovative thinking and dedication to a field where solving one of Earth's greatest challenges is the aim of the game.

At just 15 years of age, Storm recently won third prize in the Energy and Transportation division of the International Science and Engineering Fair in Atlanta after dazzling a panel of judges to take out first place in the 2008 BHP Billiton Awards.

To get there, Storm spent six hours a day for almost two months meticulously growing, filtering and weighing algae to explore the potential of sequestering carbon dioxide from industry and using it to grow algae in seawater for the purpose of producing bio-diesel.

Similarly, Shaun's research, conducted while in Year 12 at Keebra Park State High School on Queensland's Gold Coast, investigated the effects of CO<sub>2</sub> enriched atmospheres on the growth of algae species used to produce bio-diesel. He found increased concentrations of CO<sub>2</sub> would inhibit algal growth and also looked at ways to accelerate algal growth for bio-diesel production. For this Shaun won second place in the 2008 BHP Billiton Awards and was invited to the World Virtual Science and Engineering Fair in Doha, Qatar, where he took out second place in the senior high school division.

Fueled by a passion for research and a keen interest in global warming, Storm's efforts combined scientific endeavour with a dash of opportunism. Exploring the possibility of using the adverse effect of carbon-emitting industry to solve the issue of dwindling fuel supplies was heralded as sheer brilliance by her peers. According to Storm, using the plentiful resource of seawater to grow the bio-diesel producing algae was where the real value of her research could be found.

"I started looking at the natural ways to collect CO<sub>2</sub> and then thought about how by using saltwater you could sequester CO<sub>2</sub> from industry," Storm said, adding that although many people had explored the effects of growing algae in freshwater for bio-diesel production, she had never heard of saltwater being used.



*Storm Holwill doing an algae cell count using a haemocytometer*

"It is fine to think about using freshwater in places where it is plentiful, but in Australia it's the one thing we don't have enough of, yet we are surrounded by ocean. It made sense to start there."

Taking her research to the world stage brought Storm to the realisation that she was far from alone in her scientific pursuits.

"Science is really big at Marist College where I go to school and although most of my friends are involved in science, you still sometimes feel like you're the only one when you're doing something as involved as I was. When you're here, doing something as intense as this, it can feel a little strange. But going to Atlanta, I realised that I had people all around me looking at similar issues. Someone from New Mexico, the Virgin Islands and students from Portugal all exploring similar topics to what I was looking at."

Not concerned with guarding her ideas for financial gain, Storm says she is happiest

when engrossed in research, despite finding her routine of weighing and documenting algal growth grueling.

"It was really hard work and it took a lot more effort than I had expected. I ran all the tests through the first time and they didn't work so well, so I had to start again," recalls Storm who credits her determination to the family genes gained from mum, Ann Burke, who teaches science and her dad Richard Holwill, who also happens to be Storm's mathematics teacher.

She's already spent time at ANU, NSW, Monash and Melbourne universities and believes her recent scientific successes can't hurt in her plans to study pathology on the mainland in the future.

But for now, Year 10 beckons and with it comes another chance at the BHP Billiton Awards in 2009.

"For my next project, I am thinking about



sequestering CO<sub>2</sub> into soil and looking at the affects on things like forestry and soil erosion.”

Like Storm, Shaun's interest in bio-diesel production has taken him across the world, but it was a sports injury that saw his attentions turn from rugby league to research.

The same injury prompted Shaun to pursue physiotherapy at a tertiary level but now halfway through his first year at Griffith University Shaun is beginning to feel the pull of biomedical science too strong to ignore.

“Everyone expected I would go into a research field after high school, but my parents didn't really mind what I did, as long as I was happy,” Shaun said.

“After my knee injury I decided I liked physiotherapy and I've started the course, but I am still considering switching subjects next year.”

Shaun's interest in bio-diesel production was sparked by a segment on the Sunrise television program during the school holidays.

“It was talking about sustainability and the use of algae in bio-diesel production and it got me thinking,” Shaun said.

The first of his three-tiered research projects involved growing algae using different concentrations of CO<sub>2</sub> to explore what effect the Greenhouse effect would have on production. Stage two involved extracting oil from the algae using hexane to break down the cells walls. The



Shaun Williams

oil yield was then measured and energy levels tested against that of mustard oil and sunflower oils to determine the efficiency of certain types of algae as a medium for bio-diesel production.

“I'm still interested in the whole topic, but I haven't taken it any further since coming back from Qatar,” Shaun admits.

Contributing much of his success to the dedication of top-notch educators at Keebra

Park State High School, Shaun returned to his old stomping ground in July to address a school assembly in the hope of inspiring others.

“Keebra Park is one of the smaller high schools on the Gold Coast and although it has a higher student teacher ratio than many schools, I think it does so well because it just has the best teachers.”

Shaun's former principal Fran Jones agrees and is quick to point out that the school known for producing rugby league Wests Tigers star Benji Marshall has also developed quite a reputation in scientific circles.

“If you asked the man on the street, he'd say Keebra produced strong rugby league players. But ask around at university and they'd tell you Keebra was a top science school,” she said.

Of the 38 CSIRO Crest Awards ever presented, Keebra students hold 10.

And it was Sally Barnett, Shaun's former classmate from Keebra who took third place in the 2008 BHP Billiton Science Awards. While all this academic success is a grand feather in the school's cap, Fran believes the real benefits are far more personal.

“Succeeding in awards like BHP, CSIRO and internationally lets the students know they can play in the big field, not just against their peers here at school,” said Fran.

“It boosts their confidence and shows them they can achieve anything.”

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