November 20, 2014

Wired posts on a miniature device that can diagnose hundreds of diseases using one drop of blood.
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Dr. Eugene Chan and his colleagues at the DNA Medical Institute (DMI) aim to change that. Chan's team has created a portable handheld device that can diagnose hundreds of diseases using a single drop of blood with what Chan claims is gold-standard accuracy. Known as rHEALTH, the technology was developed over the course of seven years with grants from NASA, the National Institutes of Health, and the Bill and Melinda Gates Foundation. On Monday, the team received yet another nod (and more funding) as the winners of this year's Nokia Sensing XChallenge, one of several competitions run by the moonshot-seeking XPrize Foundation.

The goal of the XChallenge is to accelerate innovation in sensor technologies that address healthcare problems. Teams came up with tools intended to quickly and easily allow individuals to detect possible health problems without having to rely on analysis from large, facility-bound lab instruments. First hatched by DMI in response to a NASA challenge to create a diagnostics device that could work even in space, rHEALTH was portable from the beginning. ...

NY Times profiles an 87 year old cabbie.
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Mr. Locascio said a broker recently told him that medallions now sell for around $1 million and implored him to sell.

"I told him, 'Listen, I'll retire when you retire,' " Mr. Locascio said.

"So I'm not lying when I say I wouldn't trade the job for a million bucks." ...

Also from **The Times**, new thinking concerning patients with nonobstructive coronary artery disease.

... Now there is proof that certain medications can ward off even a first heart attack in people at risk. The two most commonly recommended are a daily baby aspirin and a statin.

Aspirin thins the blood, reducing the risk that a blood clot will form in a coronary artery. The Food and Drug Administration does not recommend daily use to prevent a first heart attack — but some doctors do. Possible side effects include an increased risk of gastrointestinal bleeding.

A statin, though primarily prescribed to lower blood levels of artery-clogging cholesterol, turns out to have cardiac benefits beyond slowing the formation of new plaques in coronary arteries.

Statins sometimes reduce the size of existing lesions. They can suppress inflammation that contributes to plaque formation. They improve the function of cells that line the arteries, enabling them to expand as needed.

Statins may also stabilize plaques, reducing the chance that they will rupture and block arteries feeding the heart.

Given these benefits and the fact that plaque rupture is the source of 95 percent of heart attacks, Dr. Maddox said that if he had coronary artery disease and was stranded on a desert island, the one drug he would want to have with him is a statin.

Tuna farming in Japan is reported by the **Wall Street Journal**.

Tokihiko Okada was on his boat one recent morning when his cellphone rang with an urgent order from a Tokyo department store. Its gourmet food section was running low on sashimi. Could he rustle up an extra tuna right away?

Mr. Okada, a researcher at Osaka's Kinki University, was only too happy to oblige—and he didn't need a fishing pole or a net. Instead, he relayed the message to a diver who plunged into a round pen with an electric harpoon and stunned an 88-pound Pacific bluefin tuna, raised from birth in captivity. It was pulled out and slaughtered immediately on the boat.

Not long ago, full farming of tuna was considered impossible. Now the business is beginning to take off, as part of a broader revolution in aquaculture that is radically changing the world's food supply.

"We get so many orders these days that we have been catching them before we can give them enough time to grow," said Mr. Okada, a tanned 57-year-old who is both academic and entrepreneur. "One more year in the water, and this fish would have been much fatter," as much as 130 pounds, he added.

With a decadeslong global consumption boom depleting natural fish populations of all kinds, demand is increasingly being met by farm-grown seafood. In 2012, farmed fish accounted for a record 42.2% of global output, compared with 13.4% in 1990 and 25.7% in 2000. A full 56% of global shrimp consumption now comes from farms, mostly in Southeast Asia and China. ...

Which leads to **Amusing Planet's** article on the sardine run off the far northeast coast of South Africa.

Every year, between the months of May and July, massive schools of sardines travel north from the cold southern oceans off South Africa's Cape Point to the warmer waters of Kwa-Zulu Natal, hugging the shore as they make their way up along the coastlines, in what is commonly known as the annual Sardine Run. These famous sardine shoals travel in seething masses stretching for up to fifteen kilometres in length, three and a half kilometres wide and nearly forty metres deep. The enormous number of sardines attract hundreds of predators who arrive en mass to partake in a feeding frenzy, creating a spectacle as spectacular as East Africa's great wildebeest migration. ...

... The sardine run is eagerly awaited by predators of the sea, including sharks, whales, dolphins and birds. The hunting strategy employed by the dolphins is particularly worth watching. Like sheepdogs working in the field, the dolphins round up the sardines into densely packed masses called "bait balls", 10–20 metres across. Working together underwater the dolphins drive the bait ball toward the surface, whirling, twisting and swimming below the shoal. Once the sardines reach the surface, the dolphins then pounce on the tiny fishes while birds plummet out of the sky to pillage from above. ...

Watts Up With That posts on Monday night's deep freeze in all 50 states.

... All 50 states have low temperatures BELOW freezing tonight. (Monday night)

Yes, even Hawaii. Tall mountain peaks there regularly get below freezing, and even get snow.

This typically happens a few times during winter, but is very rare this early in the season. ...

Popular Science on the cold that has surprised us so far this year.

There's an unwelcome guest on your doorstep, America.

It comes from the north, dragging frigid air and awful commutes like a terrible shroud over the continental United States, from the Rocky Mountains all the way to the Atlantic. While the East Coast saw temperatures about 10 degrees below average Friday, snow hit much of the Midwest following a 40 degree drop over just a couple days in Chicago, and a region stretching from Denver to Montana saw sub-zero chills and record lows.

This morning, in the stairwell of an apartment building, even New York City's relatively mild mid-30s weather prodded a father into a shouting match with his weeping child: "But I don't want to go to school today! It's too cold to go outside!" "Put your coat on, now!" And in the halls of climate research centers and weather stations across the nation, the cold snap is spurring a more technical, but no less divisive debate -- one that matters to millions of Americans who remember the last awful winter: Is this the new normal? ...

We close with late night humor from **Andrew Malcolm**.

Fallon: The city of Paris may start fining people for taking night-time photos of the Eiffel Tower because its light show is copyrighted. That explains France's new tourism slogan: "Go home!"

Conan: Hackers infiltrated the Postal Service's network. The Post Office was shocked about it, and even more shocked that it has a computer.

Meyers: A Florida man got six months in jail for stockpiling weapons just 11 miles from Disney World -- 11 miles from Disney World? So…in the parking lot?

Wired

This Device Diagnoses Hundreds of Diseases Using a Single Drop of Blood

by Davey Alba

The digital health revolution is still stuck.

Tech giants are jumping into the fray with fitness offerings like Apple Health and Google Fit, but there's still not much in the way of, well, actual medicine. The Fitbits and Jawbones of the world measure users' steps and heart rate, but they don't get into the deep diagnostics of, say, biomarkers, the internal indicators that can serve as an early warning sign of a serious ailment. For now, those who want to screen for a disease or measure a medical condition with clinical accuracy still need to go to the doctor.

Dr. Eugene Chan and his colleagues at the DNA Medical Institute (DMI) aim to change that. Chan's team has created a portable handheld device that can diagnose hundreds of diseases using a single drop of blood with what Chan claims is gold-standard accuracy. Known as rHEALTH, the technology was developed over the course of seven years with grants from NASA, the National Institutes of Health, and the Bill and Melinda Gates Foundation. On Monday, the team received yet another nod (and more funding) as the winners of this year's Nokia Sensing XChallenge, one of several competitions run by the moonshot-seeking XPrize Foundation.

The goal of the XChallenge is to accelerate innovation in sensor technologies that address healthcare problems. Teams came up with tools intended to quickly and easily allow individuals to detect possible health problems without having to rely on analysis from large, facility-bound lab instruments. First hatched by DMI in response to a NASA challenge to create a diagnostics device that could work even in space, rHEALTH was portable from the beginning.

“There used to be no method for good, autonomous diagnosis,” Chan tells WIRED. “rHEALTH technology is highly sensitive, quantitative, and capable of meeting the FDA’s bar for sophistication, while still being geared for consumers.”

Blood to Bluetooth

Here’s how it works: One small drop of blood is dropped into a small receptacle, where nanostrips and reagents react to the blood’s contents. The whole cocktail then goes through a spiral micro-mixer and is streamed past lasers that use variations in light intensity and scattering to come up with a diagnosis, from flu to a more serious illness such as pneumonia—or even Ebola—within a few minutes. There’s also a vitals patch that users can wear to get continuous health readings—EKG, heart rate, body temperature—delivered to their smartphone or the rHEALTH device itself via a Bluetooth link. An app called CHAS (Comprehensive Health Assessment Unit) can walk the user through the process of self-diagnosis.

The real innovation of rHEALTH, according to Chan, is in getting all the diagnostics technologies packed together into one handheld device. By shrinking its components so much compared to traditional devices, Chan says, patients will need to give 1,500 times less blood than they would for regular tests. Since it was originally developed for NASA, the device has even been tested in simulated lunar and zero gravity. “It’s a symphony of innovations, but we’ve pushed all of them individually to create the device,” Chan says.

The hope is that people will use the technology to make meaningful lifestyle changes based on real, robust medical data.

Right now, rHEALTH is reliable for cell counts, HIV detection, vitamin D levels, and various protein markers in the body. The next challenges, according to Chan, are adding more tests, scaling up production, and going through the laborious process of getting the rHEALTH commercialized. The company is manufacturing three different models: the rHEALTH One, which will be used for translational research; the rHEALTH X, meant to be used as a kind of power tool for clinicians; and the rHEALTH X1, which will be available for consumers.

Since the rHEALTH One must only be vetted by Institutional Review Boards (IRBs) before being used in research—it doesn’t have to meet stringent FDA standards it will need to reach before being marketing to physicians and consumers—Chan says DMI can ship units in a matter of weeks to interested scientists. Chan’s team will learn from how it’s utilized in research settings to make improvements.

Making Real Changes

It could be a while before consumers actually get access to rHEALTH. In the meantime, the next challenge for Chan and his team is to prepare for the bigger, $10 million challenge from the XPrize Foundation, the Tricorder XPRIZE, which the Nokia Sensing XChallenge was set up to feed. The goal is to create a universal, Star Trek-inspired medical diagnostic tool that detects up to 16

separate health conditions. Of the 11 teams included in the Sensing XChallenge, only DMI is also a Tricorder finalist.

When rHEALTH finally does become available to consumers, Chan says the hope is that people will use the technology to make meaningful lifestyle changes based on the real, robust medical data from the device—a step beyond what he sees as the typical fitness tracker.

“It’s interesting to see how people interact with wearables,” says Chan. “A lot of them think of them as toys or gadgets. That’s not what rHEALTH is. It’s really meant to help you take care of yourself when you’ve got a serious health condition.”

NY Times

Five Decades of Patter

The Oldest Yellow-Cab Driver in New York City With His Own Medallion

by Corey Kilgannon

Sal Locascio, 87, is the oldest medallion-owning cabdriver in New York City.

With a half-century’s worth of experience driving a yellow cab in New York City, Sal Locascio, 87, knows the streets as well as anyone.

“I do all right for a hillbilly,” said Mr. Locascio, a joking reference to his lifelong residency in the village of Pleasantville, in Westchester County.

“I’m the oldest yellow cabby, or I’m pretty darn close to it,” he said. The city’s Taxi & Limousine Commission said that there were several drivers older than Mr. Locascio who hold hack licenses, but that he was the oldest yellow-cab driver with his own medallion.

Mr. Locascio, a World War II veteran, was hardly savvy when he began driving a yellow cab in the early 1960s.

“I had a passenger who came in as a guy and got out as a girl,” he recalled. “And I said to myself, ‘O.K., this is New York.’ ”

Fifty years later, he said, the traffic is worse and he recognizes fewer celebrities. But it is still the same city that Mr. Locascio commutes to six days a week in his 2011 Crown Victoria, which he keeps immaculate with daily washing and waxing, hitting a different section each day.

The front seat is a sea of belongings, including the daily newspapers and a clipboard where he constantly jots down personal notes and the day’s to-do list. He leans his right elbow on several grapefruit-size balls he has made from rubber bands people have given him during his daily circuit of social pit stops in Manhattan. He keeps hard candy in his pockets and a box of dog biscuits in the trunk, for dispensing.

Mr. Locascio sits on a stack of four mats and cushions, and on Monday he wore faded brown slacks and a ripped flannel shirt, as if dressed for a 1970s New York movie.

He dropped a British businesswoman at Bryant Park and slipped the tip she handed him into a wad of bills in his shirt pocket.

Mr. Locascio said that after high school, he worked in construction for his father, a Sicilian immigrant, and then did a stint as a buildings inspector in the city. He lost the job and began driving a yellow cab in the early 1960s.

“I could see I was stuck in the racket,” he said, so in 1968 he bought a medallion for $25,500.

Mr. Locascio said a broker recently told him that medallions now sell for around $1 million and implored him to sell.

“I told him, ‘Listen, I’ll retire when you retire,’ ” Mr. Locascio said.

“So I’m not lying when I say I wouldn’t trade the job for a million bucks.”

He paid off the loan for his medallion in four years by working more than 80 hours a week, he said, but he now drives only from 1 to 8 p.m., every day except Sunday. He credits his longevity to avoiding driving when not working and to the exercise he gets on his daily walks into the village to run errands.

His wife, Anita, and several old friends have passed away in recent years, he said.

“So, what matters to me now is to keep myself going,” he said. “You’re a short time alive and a long time dead.”

Mr. Locascio said he had turned down many offers to take on a night driver. “Everybody wants to drive my cab,” he said, “but I’ll only let three guys drive it: me, myself and I.”

He described his style of driving as “slow and getting slower,” but added that this was not the case in the 1960s when he once picked up Judy Garland.

“She said I was going too fast — and at the time I was much faster than I am now,” he said, adding that he once picked up Joe DiMaggio on a stifling hot summer day, with no air-conditioning in the cab.

“It was so hot in the cab, the poor guy was turning colors,” he said. “We were in heavy Midtown traffic, so I said, ‘Mr. DiMaggio, you’re turning colors — you’d be better off walking,’ so he got out.”

After picking up Eli Wallach repeatedly on West 81st Street, he gave the actor an ultimatum.

“I said, ‘Mr. Wallach, if I pick you up there one more time, you’re going to have to hire me,’ ” Mr. Locascio recalled.

“I once picked up Vincent Price, and I could tell it was him by his voice,” he said. “I told him, ‘You used to scare the heck out of me — I used to crawl under my seat in the theater.’ ”

As for Gregory Peck, Mr. Locascio recalled, “His wife was very good-looking and he caught me looking at her.”

The list of famous riders goes on, including Mickey Mantle, Burgess Meredith and a coterie of New York politicians that has included the likes of Mayors John V. Lindsay and Robert F. Wagner and Senator Daniel Patrick Moynihan.

“Now they’re all gone, except me,” he said.

After half a century of driving, Mr. Locascio has developed a schtick, complete with reformulated names for places that are problematic — “Horror Hills,” for Forest Hills, or the “Van Wack” for the Van Wyck Expressway. Or, he said, “If a passenger gets in and says ‘Queens,’ you respond, ‘Kings – you lose.’ ”

Mr. Locascio said he was less talkative in the cab now and had refrained from getting aids to help his declining hearing.

“After all these years, I don’t want to hear half the baloney people are saying anyway,” he said.

NY Times

An Incipient Threat to Our Hearts

by Jane E. Brody

Millions of Americans are walking around with deposits in their coronary arteries that do not obstruct blood flow to their hearts — at least, not until a piece of the plaque ruptures and forms a blood clot, causing a heart attack.

These plaques are signs of a condition called nonobstructive coronary artery disease, and they are found in 10 percent to 25 percent of patients who have a coronary angiogram, typically done for patients with symptoms like chest pain or shortness of breath or those who flunk a cardiac stress test.

Historically, doctors have considered the partial obstructions insignificant, and a surprisingly large percentage of patients with them are sent home without treatment. Often patients are given “the good news that they don’t have a coronary blockage,” said Dr. Thomas M. Maddox, a cardiologist at the Veterans Affairs Eastern Colorado Health Care System and the University of Colorado in Denver.

Sadly, the news isn't really good. By some estimates, the majority of heart attacks result from these nonobstructive lesions. Four years ago, Dr. Maddox and his colleagues published a study of nearly 1.5 million patients with varying degrees of coronary artery disease. Compared with those who had major obstructions in their coronary arteries, patients with nonobstructive lesions were less likely to be prescribed therapy with aspirin, a statin or other drugs to reduce their heart attack risk.

This month, Dr. Maddox and co-authors published a study in JAMA graphically demonstrating the sometimes devastating consequences of ignoring nonobstructive coronary disease, especially in patients with symptoms.

The researchers gathered data on 37,674 veterans without known coronary artery disease who underwent elective angiograms between October 2007 and September 2012 in the Veterans Affairs health care system. Fifty-five percent were found to have obstructive coronary disease, and 22 percent had nonobstructive disease. The risk of having a heart attack or dying within one year was directly related to the extent of disease in the participant's coronary arteries. As expected, the risk was greatest among patients who had obstructive coronary disease, defined as a blockage equal to or greater than 70 percent in one or more coronary arteries.

But the prognosis for patients with nonobstructive disease was hardly benign.

Compared with those who had no evidence of coronary artery disease, or CAD, the risk of suffering a heart attack within just one year of the exam was doubled in patients with nonobstructive CAD in one artery, and more than four times greater in those with nonobstructive disease in two or three arteries. The death rate increased with the extent of nonobstructive disease.

"These findings highlight the need to recognize that nonobstructive CAD is associated with significantly increased risk for myocardial infarction," or heart attack, Dr. Maddox and his colleagues concluded.

The researchers spurned the traditional distinction made between nonobstructive and obstructive CAD, and suggested that all patients with nonobstructive disease would likely benefit from drug treatment — although no randomized clinical trials have yet been done to support this recommendation. (In particular, stents have not been shown to be an effective preventive for such patients.)

"If we did an angiogram on every adult, a significant number would be found to have nonobstructive disease and be at risk of a heart attack," Dr. Maddox said in an interview. "If an angiogram shows a blockage of 30, 40 or 50 percent in one or more arteries, the patient should be on preventive therapy."

He does not recommend routine angiograms, however, which are costly and have risks of their own. On rare occasions, they can cause bleeding, infection, damage to blood vessels, or an allergic reaction to the dye used. Alternatively, patients can choose a noninvasive test, like a coronary calcium score or CT angiogram.

Heart disease is linked to a slew of risk factors: smoking; being overweight, obese or physically inactive; having high cholesterol, high blood pressure, Type 2 diabetes or pre-diabetes; a family history of heart disease before age 65; consuming an unhealthy diet; and being 55 or older. Chronic stress also has been linked to heart disease.

Doctors usually advise patients at risk to modify their living habits. If they smoke, they should stop — within as little as a year, their coronary risk can drop to that of a nonsmoker.

Those who are overweight may be told to cut down on fattening foods, eat more fruits and vegetables, and to exercise more, measures that help lower body weight and cholesterol and help control high blood pressure and diabetes.

If high cholesterol is a problem, saturated fats like dairy and meat fat should be reduced, and unsaturated olive or canola oil used when fat is needed.

Some of this advice was given to my father in 1979 after he suffered a heart attack at age 58. He never smoked, was already active and not overweight. He modified his diet, which helped to keep him alive for 13 more years. But lacking anything more to do to protect himself, he succumbed to a second heart attack at age 71.

Now there is proof that certain medications can ward off even a first heart attack in people at risk. The two most commonly recommended are a daily baby aspirin and a statin.

Aspirin thins the blood, reducing the risk that a blood clot will form in a coronary artery. The Food and Drug Administration does not recommend daily use to prevent a first heart attack — but some doctors do. Possible side effects include an increased risk of gastrointestinal bleeding.

A statin, though primarily prescribed to lower blood levels of artery-clogging cholesterol, turns out to have cardiac benefits beyond slowing the formation of new plaques in coronary arteries.

Statins sometimes reduce the size of existing lesions. They can suppress inflammation that contributes to plaque formation. They improve the function of cells that line the arteries, enabling them to expand as needed.

Statins may also stabilize plaques, reducing the chance that they will rupture and block arteries feeding the heart.

Given these benefits and the fact that plaque rupture is the source of 95 percent of heart attacks, Dr. Maddox said that if he had coronary artery disease and was stranded on a desert island, the one drug he would want to have with him is a statin.

WSJ

Taming the Wild Tuna - Why Farmed Fish Are Taking Over Our Dinner Plates

Japan Breeds Bluefin Tuna in Captivity, Following Path of Salmon, Shrimp

by Yuka Hayashi

KUSHIMOTO, Japan— Tokihiko Okada was on his boat one recent morning when his cellphone rang with an urgent order from a Tokyo department store. Its gourmet food section was running low on sashimi. Could he rustle up an extra tuna right away?

Mr. Okada, a researcher at Osaka's Kinki University, was only too happy to oblige—and he didn't need a fishing pole or a net. Instead, he relayed the message to a diver who plunged into a round

pen with an electric harpoon and stunned an 88-pound Pacific bluefin tuna, raised from birth in captivity. It was pulled out and slaughtered immediately on the boat.

Not long ago, full farming of tuna was considered impossible. Now the business is beginning to take off, as part of a broader revolution in aquaculture that is radically changing the world's food supply.

"We get so many orders these days that we have been catching them before we can give them enough time to grow," said Mr. Okada, a tanned 57-year-old who is both academic and entrepreneur. "One more year in the water, and this fish would have been much fatter," as much as 130 pounds, he added.

With a decadeslong global consumption boom depleting natural fish populations of all kinds, demand is increasingly being met by farm-grown seafood. In 2012, farmed fish accounted for a record 42.2% of global output, compared with 13.4% in 1990 and 25.7% in 2000. A full 56% of global shrimp consumption now comes from farms, mostly in Southeast Asia and China. Oysters are started in hatcheries and then seeded in ocean beds. Atlantic salmon farming, which only started in earnest in the mid-1980s, now accounts for 99% of world-wide production—so much so that it has drawn criticism for polluting local water systems and spreading diseases to wild fish.

Until recently, the Pacific bluefin tuna defied this sort of domestication. The bluefin can weigh as much as 900 pounds and barrels through the seas at up to 30 miles an hour. Over a month, it may roam thousands of miles of the Pacific. The massive creature is also moody, easily disturbed by light, noise or subtle changes in the water temperature. It hurtles through the water in a straight line, making it prone to fatal collisions in captivity.

The Japanese treasure the fish's rich red meat so much that they call it "hon-maguro" or "true tuna." Others call it the Porsche of the sea. At an auction in Tokyo, a single bluefin once sold for $1.5 million, or $3,000 a pound.

All this has put the wild Pacific bluefin tuna in a perilous state. Stocks today are less than one-fifth of their peak in the early 1960s, around the time Japanese industrial freezer ships began prowling the oceans, according to an estimate by an international governmental committee monitoring tuna fishing in the Pacific. The wild population is now estimated by that committee at 44,848 tons, or roughly nine million fish, down nearly 50% in the past decade.

The decline has been exacerbated by earlier efforts to cultivate tuna. Fishermen often catch juvenile fish in the wild that are then raised to adulthood in pens. The practice cuts short the breeding cycle by removing much of the next generation from the seas.

Net pens, originally developed by Teruo Hara, are seen in this photo taken in the 1950s. The pens improved the efficiency of fish farming dramatically compared with the preceding era, when fish were kept in much larger spaces in the bay created by simple partitions.

Scientists at Kinki University decided to take a different approach. Kinki began studying aquaculture after World War II in an effort to ease food shortages. Under the motto “Till the Ocean,” researchers built expertise in breeding fish popular in the Japanese diet such as flounder and amberjack.

In 1969, long before the world started craving fresh slices of fatty tuna, Kinki embarked on a quest to tame the bluefin. It sought to complete the reproduction cycle, with Pacific bluefin tuna eggs, babies, juveniles and adults all in the farming system.

Two scientists from Kinki went out to sea with local fishermen, seeking to capture juvenile tuna for raising in captivity. “We researchers always wanted to raise bluefin because it’s big and fast. It’s so special,” said one of the scientists, Hidemi Kumai, now 79 years old. “We knew from the beginning it was going to be a huge challenge.”

It was more than that. The moment the researchers grabbed a few juvenile fish out of a net, the skin started to disintegrate, killing them. It took four years just to perfect delicate fast-releasing hooks for capturing juveniles and moving them into pens.

“Local fishermen used to say to us, ‘Professors, you are crazy. Bluefin can’t live in confinement,’ ” Mr. Kumai recalled.

In 2011, Kinki lost more than 300 grown fish out of is stock of 2,600 after an earthquake-triggered tsunami hit a coastline 400 miles away. The tsunami triggered a quick shift in tide and clouded the

water, causing the fish to panic and smash into nets. Last year, a typhoon decimated its stock. Again this summer, frequent typhoons kept the researchers on their toes as they waited for the breeding season to start. “Oftentimes, all we can do is pray,” said Mr. Okada as he threw a mound of mackerel into the pen using a spade.

It took nearly 10 years for fish caught in the wild to lay eggs at Kinki’s research pens. Then, in 1983, they stopped laying, and for 11 years, researchers couldn’t figure out the problem. The Kinki scientists now attribute the hiatus to intraday drops in water temperature, a lesson learned only after successful breeding at a separate facility in southern Japan.

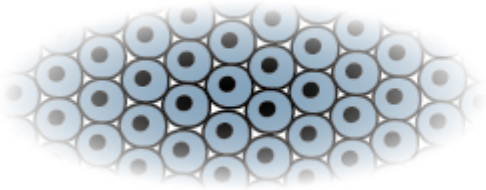
In the summer of 1994, the fish finally produced eggs again. The researchers celebrated and put nearly 2,000 baby fish in an offshore pen. The next morning, most of them were dead with their neck bones broken. The cause was a mystery until a clue came weeks later. Some of the babies in the lab panicked when the lights came on after a temporary blackout and killed themselves.

Mr. Kumai and colleagues realized that sudden bright light from a car, fireworks or lightning caused the fish to panic and bump into each other or into the walls. The solution was to keep the lights on at all times.

For nearly five decades, Mr. Kumai has lived along a quiet inlet, steps from the university’s research pens. He calls the fish “my family.”

“These fish can’t protest with their mouths so they protest by dying,” he says. “We must listen to them carefully so we catch the problems before they resort to dying.”

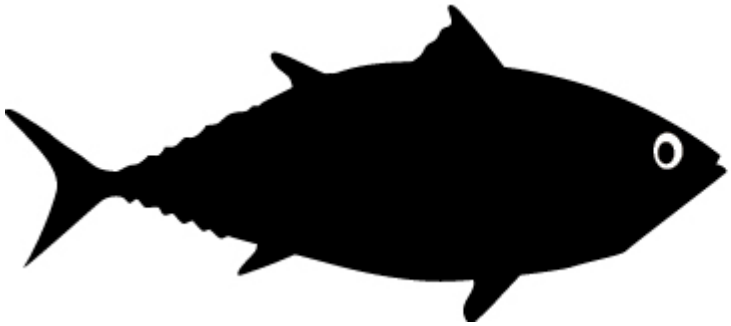
Tuna Life Cycle



Egg
Breeding occurs annually, usually in the summer. Each time, a mother fish is believed to lay several million eggs, each measuring 1/25 of an inch in diameter. Eggs are moved to indoor tanks as soon as they are laid.

Larvae
Larvae hatch in 32 hours, measuring about twice the size of an egg when born. They are kept in indoor tanks until they are 20 to 30 days old, which is a difficult stage because of bacterial attack and cannibalism.

Fry
Fry are ready to be moved to offshore pens once they grow to be 2 inches. They are still sensitive to changes in water temperature, tide or light.



Juvenile fish
By the time they are 3 months old, the fish are 12 inches long, weigh 10 ounces and are quite hardy. They are ready to be sold to commercial farms where they are fattened for three to five years.

Adult
When they turn 3 years old, the fish are considered adult, measuring about 3 feet long and weighing 65 pounds or more. Some fish may eventually reach 10 feet long and weigh up to 900 pounds.

At last, in 2002, the Kinki team became the first in the world to breed captive bluefin from parents that were themselves born in captivity. The circle was complete.

But the survival rate remained low. While farmed Atlantic salmon had developed into a multibillion-dollar business, it seemed doubtful for years that the tuna undertaking could be commercially viable.

Kinki University had funded its project with proceeds from the sale of more common fish raised at its research facilities. That kept the tuna farming alive even after other academic and commercial organizations gave up.

Now the university needed help from someone with deeper pockets, and by the latter half of the last decade the timing was right. The world's voracious appetite for sushi and gourmet fish was eroding stocks of bluefin tuna and governments were beginning to clamp down on overfishing.

The country most at risk of a tuna shortage was Japan, which consumes 80% of the world's overall catch, or some 40,000 tons annually. Japanese trading companies with big fisheries operations such as Mitsubishi Corp. and Sojitz Corp. began courting the Kinki researchers.

One early supporter was a young employee of Toyota Tsusho Corp., a trading company affiliated with the auto maker. Taizou Fukuta was working at a desk job in the company's finance department in Nagoya when he saw a documentary about the tuna project. He was inspired to

propose a tuna farming business in a Toyota in-house venture contest and won, according to Mr. Fukuta.

With $1 million in seed money, Mr. Fukuta, now 39, visited Kinki's Mr. Okada, the university's head of tuna research, many times until the academic agreed to team up with Toyota in 2009. "I was truly impressed by their insistence on sticking with this project for over 30 years," says Mr. Fukuta, who is now team leader of the company's agriculture and aquaculture business.

Toyota footed the bill for larger facilities where baby fish hatched at the university's labs could be raised in large numbers for about four months. At that point, the juvenile fish are stable enough to be sold to commercial tuna ranches, where they are fattened in round pens around 100 feet in diameter and 30 feet deep for three to four years before being sold for slaughter.

Mr. Fukuta gave up his desk job and moved to a small island off the southern island of Kyushu that offered a warm climate ideal for raising baby tuna. He persuaded local fishermen to lease his company the rights to set up dozens of fish pens. He learned to dive and to steer a boat.

The first shipment of baby fish, or fry, from Kinki came in a tank carried on a truck and ended with a 90% loss. Mr. Fukuta ordered a boat for the following shipments. More fish died when the winter's chill arrived, sending the businessman to work with a feed company to develop artificial feed that kept the fish warm. Mr. Fukuta lost yet more fish as he prepared to ship them to buyers; they couldn't be transferred into the hold of a boat for their journey without smashing into the body of the vessel. A giant funnel made of smooth material was invented to guide the fish into the ship.

"We come from the tradition of manufacturing, where we improve the products through the process of *kaizen*," Mr. Fukuta said, referring to Toyota Motor Corp.'s manufacturing philosophy of constant improvement.

After shipping an average of 20,000 juvenile fish a year over the past three years, Toyota's production is expected to rise to 40,000 by next year.

That complements Kinki's own capacity for about the same number of fish. Together, they could supply nearly 20% of the demand for juvenile fish at Japanese tuna farms, taking pressure off the wild stock. This year, Mr. Fukuta says the venture he proposed five years ago is likely to break even for the first time.

Today around one or two in 100 of the baby tuna hatching from eggs at Kinki survive to adulthood, up from one in several hundred a few years ago. By contrast, only about one in 30 million babies hatched from eggs in the wild survive to adulthood.

Other companies are also expanding their tuna business. Using Kinki-bred juvenile fish, a Mitsubishi Corp. unit has opened a commercial tuna ranch in southern Japan. It hopes to ship 300 tons of farm-bred tuna this year, up from 40 tons last year.

"We are seeing unprecedented demand for good-tasting fish, even from countries that didn't eat fish before. We need to achieve self-sufficiency through farming. We can't dip into natural resources anymore," says Mr. Kumai, the longtime Kinki researcher.

Demand is certainly rising for the farmed tuna from gourmet stores and sushi restaurants in Japan. The university itself runs two restaurants in Tokyo's Ginza district and Osaka, both of them booked months in advance, it says. In Nagasaki prefecture, one of the main areas for domestic tuna

farming, shipments of farmed bluefin rose to 3,000 tons in 2013, nearly five times the amount five years earlier.

At Kinki University's restaurant in Tokyo's Ginza district, the most popular lunchtime dish is a sashimi rice bowl. The slices of red meat on the left side are bluefin tuna raised in captivity at one of Kinki's labs

Environmental concerns remain. Bluefin tuna require 15 pounds of feed fish to produce 1 pound of meat, prompting the Kinki team and others to look for artificial feed. Benefits of artificial feed include less pollution. With real fish, a large part is left uneaten and sinks to the bottom of the ocean, polluting the water. Artificial pellets are easier to eat so there are fewer leftovers. The team has been able to replace up to 30% of the ingredients with vegetable protein but going further stunts the fishes' growth.

There is also the question of whether farmed tuna taste as good as wild-caught. Some customers complained the early generation of Kinki's tuna were too fatty even in a market where fatty tuna is treasured. Farm-grown fish currently fetch only about half the price of premium wild-caught tuna. The problem, Kinki researchers say, has been solved by changing the composition of feed.

Still, the biggest problem is the high attrition rate of juvenile farmed tuna.

Kinki's Mr. Okada says that while captive-bred bluefin are visually indistinguishable from their wild counterparts, their behaviors are different. The farmed fish, Mr. Okada explains, are "delicate and moody," favoring one type of feed one day and another the next day. They are also less capable in avoiding sudden danger, making them more prone to fatal collisions.

The researchers also worry about the possibility of an outbreak of abnormalities as the fish all come from a single genetic linage, descended from the successful breeding in 2002. They have experimented with bringing in wild-caught fish to mate with the captive-bred fish to diversify the gene pool, but without success so far.

“We sometimes wonder if these fish are a little stupid,” he said. “But in the wild, only one in tens of millions becomes an adult. Here, even in our imperfect hands, one in every one hundred fish survives now. If they are a little clumsy, maybe it’s no mystery.”

Amusing Planet

The Sardine Run, South Africa

by Kaushik

Every year, between the months of May and July, massive schools of sardines travel north from the cold southern oceans off South Africa's Cape Point to the warmer waters of Kwa-Zulu Natal, hugging the shore as they make their way up along the coastlines, in what is commonly known as the annual Sardine Run. These famous sardine shoals travel in seething masses stretching for up to fifteen kilometres in length, three and a half kilometres wide and nearly forty metres deep. The enormous number of sardines attract hundreds of predators who arrive en mass to partake in a feeding frenzy, creating a spectacle as spectacular as East Africa's great wildebeest migration.

The Sardine Run occurs during the winter months when a cold south to north-flowing current develops off the east coast, moving inshore and counter to the Aghulas current. The sardine population follows this narrow band of cool water north to Port Edward, swimming up between the coast and warm Aghulas current. North of Port Edward the cold current is restricted by the

narrowing continental shelf and the shoals become concentrated in a narrow inshore band of water, as far as Mozambique where it then leaves the coastline and goes further east into the Indian Ocean. What prompts the sardines to migrate is still poorly understood.

The number of sardines taking part in the annual migration vary from year to year, and it is only considered a "run" when the shoals are big enough to be visible at the surface. Occasionally, sardines would fail to run. This may be either because of abnormal water temperature or other hydrographic barriers, or the migration may occur farther offshore and possibly deeper where they couldn’t be detected by coastal observers.

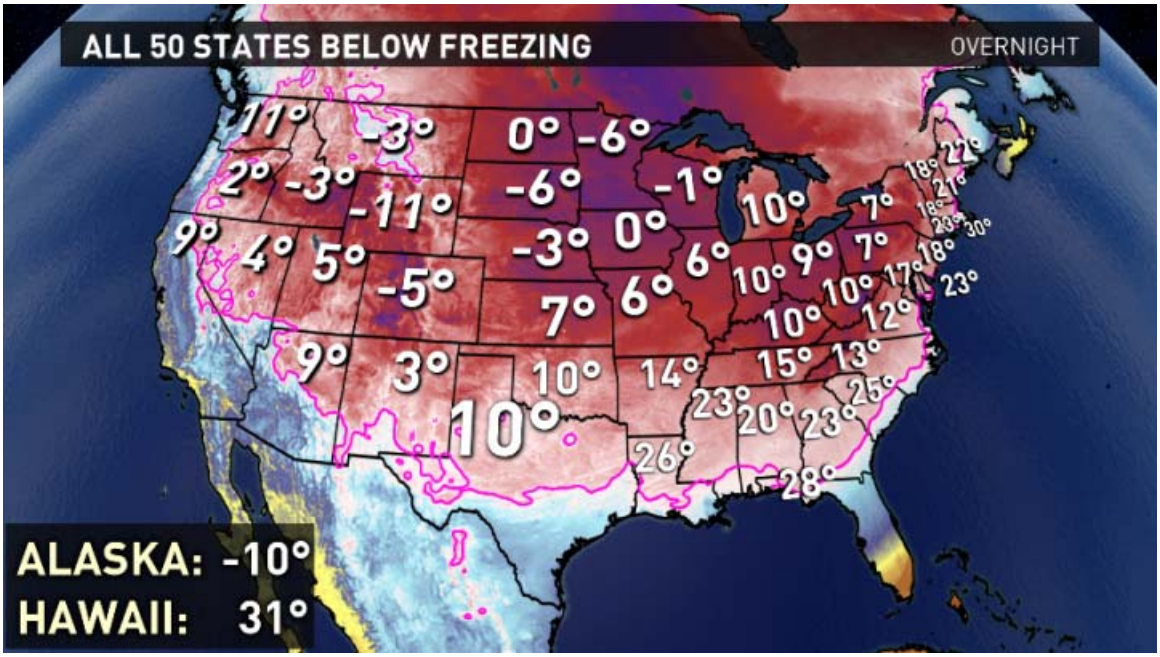
The sardine run is eagerly awaited by predators of the sea, including sharks, whales, dolphins and birds. The hunting strategy employed by the dolphins is particularly worth watching. Like sheepdogs working in the field, the dolphins round up the sardines into densely packed masses called “bait balls”, 10–20 metres across. Working together underwater the dolphins drive the bait ball toward the surface, whirling, twisting and swimming below the shoal. Once the sardines reach the surface, the dolphins then pounce on the tiny fishes while birds plummet out of the sky to pillage from above. Occasionally sharks and sometimes whale also take advantage of the opportunity. In areas where the sardines swim very close to the coast, fishermen wade into the water and secure their share.

Watts Up With That

[All 50 states have below freezing temperatures]

by Anthony Watts

Meteorologist Tim Buckley of WFMY-TV writes on [Facebook]:



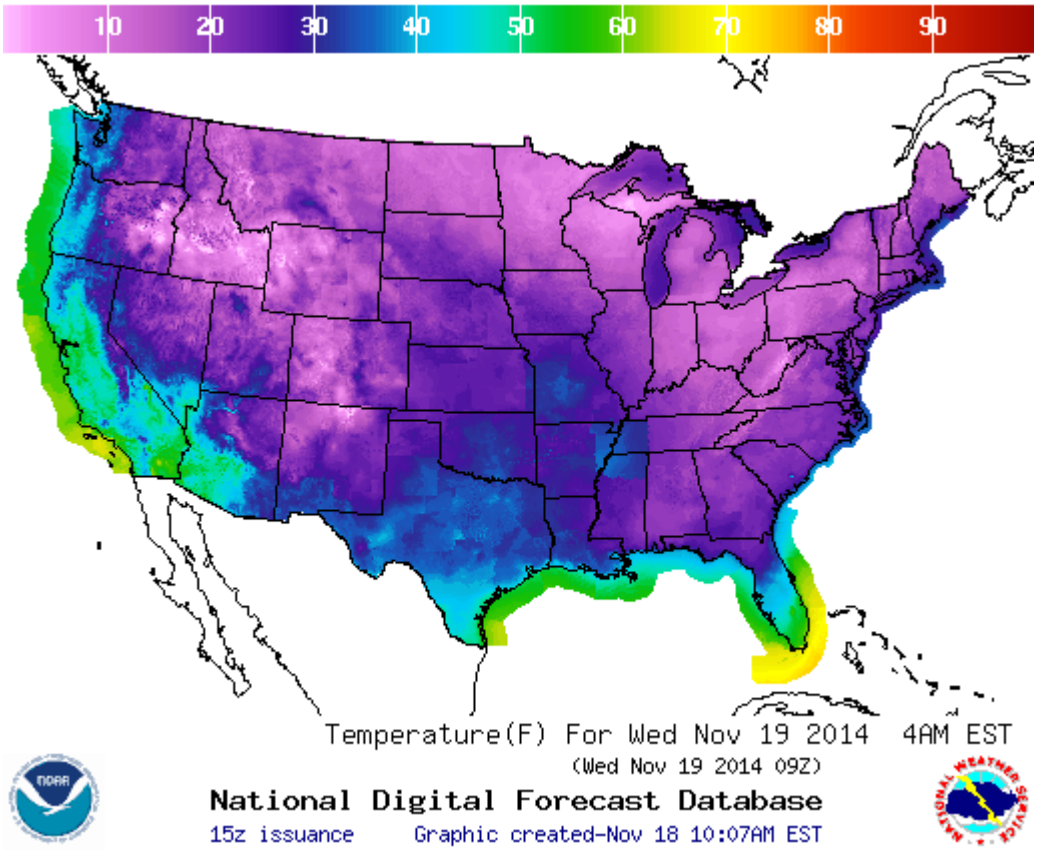
All 50 states have low temperatures BELOW freezing tonight. (Monday night)

Yes, even Hawaii. Tall mountain peaks there regularly get below freezing, and even get snow.

This typically happens a few times during winter, but is very rare this early in the season.

Pretty neat!

The low temperature forecast for tonight shows the cold continuing nationally, with perhaps a second night of below freezing temperatures in all 50 states:



Popular Science

Are We Doomed To Arctic Winters In America?

Scientists square off on the coming freeze

by Rafi Letzter

There's an unwelcome guest on your doorstep, America.

It comes from the north, dragging frigid air and awful commutes like a terrible shroud over the continental United States, from the Rocky Mountains all the way to the Atlantic. While the East Coast saw temperatures about 10 degrees below average Friday, snow hit much of the Midwest

following a 40 degree drop over just a couple days in Chicago, and a region stretching from Denver to Montana saw sub-zero chills and record lows.

This morning, in the stairwell of an apartment building, even New York City's relatively mild mid-30s weather prodded a father into a shouting match with his weeping child: "But I don't want to go to school today! It's too cold to go outside!" "Put your coat on, now!" And in the halls of climate research centers and weather stations across the nation, the cold snap is spurring a more technical, but no less divisive debate -- one that matters to millions of Americans who remember the last awful winter: Is this the new normal?

Ice, Alaska, And Damned Typhoons

With nearly two weeks left before Thanksgiving, this should be a time for tweed and brisk walks through colorful fallen leaves (the autumn the Lands End catalog promised us). Instead, if you live anywhere from Chicago to Appalachia you've likely found yourself breaking out the Gore-Tex for a slog through accumulating snow and ice, with more likely coming this weekend, and its all because of a storm on the other side of the world.

Typhoon Nuri formed in the West Pacific and surged north, peaking with sustained winds around 180 miles per hour -- one of the strongest typhoons or hurricanes of the year. As it moved past Japan and into the Arctic it weakened, but its powerful remnants still delivered tropical storm conditions to Alaska's Aleutian Islands, Eastern Russia, and the Bering Strait.

You'd think a mega storm careening off into the underpopulated Arctic would be a kind of best-case scenario, and in many ways it is. There are fewer houses and people out in those cold places, and local damage was minimal. But those sparse communities share air with the jet stream (or "polar vortex"), a muscular current of air that circles counter-clockwise high in the atmosphere between the warmer air masses of the mid-latitudes and the much colder northern reaches.

Several scientists who disagree on most other issues surrounding polar vortex events (including whether "polar vortex" is an acceptable or ridiculous name for these Arctic air surges) came up with just about identical analogies for what happened when Nuri slammed into the jet stream: a taut rope snapping. All that frozen air normally locked in a tight spiral snapped south between an air pressure ridge over the Rockies and Greenland. The resulting arctic wave sunk temperatures far below average along the American continent, and they'll likely remain low for a couple of weeks.

Polar America

Martin Hoerling, a scientist (and according to some of his colleagues, a contrarian) studying climate change with the National Oceanic and Atmospheric Administration (NOAA), says fears of frozen winters future are fair but unfounded.

He says, "If I were a member of the public I'd be thinking, 'Oh God, I barely survived the last winter and now it's getting cold again? Is this what I can expect from now on?'" But Hoerling says this pattern of typhoon-induced cold fronts is not new, it's just been given the new, scary, "polar vortex" branding.

If anything, he says, the warming world will see fewer extreme weather shifts because the Arctic and mid-latitudes will be nearer in temperature. But Jennifer Francis, a researcher with the Institute of Marine and Coastal Sciences at Rutgers University who studies the impact of Arctic warming on the global climate, disagrees. Her research predicts that as Arctic warms (and it is warming extraordinarily quickly) the jet stream will weaken and narrow. "When you have a strong jet stream it's like a thick rope. You can give one end a tug and not much happens." But as it weakens, she says, it's more like a string. A shake (or a typhoon) will send waves all along its length, causing the Arctic monster to move south more often.

While Hoerling dismisses Francis's research as "pure conjecture", and points to early failures to verify her predictions, other meteorologists and climatologists look at several recent studies and are more convinced.

James Overland, also of NOAA, says he leans toward Francis's view. "In the last five years we've seen more of the wavy [jet stream] patterns in January and December than we did before," he says. In his view, it makes sense that a warmed Arctic would break down the jet stream's regular tight ellipse.

Francis acknowledges that her research does not fully account for everything that will impact this winter and those that follow. "All these are pieces to the puzzle," she says.

The debate might seem academic, but its consequences go far beyond discomfort. Last year's harsh winter cost the economy billions, and revealed just how unprepared much of the country is for even slight shifts in storm patterns. More winters like the last could mean more deaths, widespread damage, and economic sluggishness.

So, About January?

All other things being equal, meteorologists expect a weak but warming El Niño effect to render this winter a relatively mild one, though forecasters have lowered the probability from 65 to 58 percent at last measure. Hoerling, along with most other researchers, says there's no reason to expect the current cold snap to portend a trend this season. But Francis isn't so sure.

"It all depends on what happens with El Niño -- if it does form, what we're seeing right now will probably end," she says. But she says it looks more and more likely that won't happen. "The pattern of surface temperature in the North Pacific look a lot like last winter."

In other words, let's hope that unwelcome guest packs up and leaves for good. But if it comes back, bringing with it plunging mercury, snot-icicles, and general misery, you'd best be ready. *Shiver*

Someplace near Buffalo

Investor's Business Daily

Late Night Humor

by Andrew Malcolm

Conan: Justin Bieber hung out with the Pittsburgh Steelers before a recent game and then, the Steelers lost. Apparently, the Steelers weren't inspired by his speech, "Win One for the Bieber."

Fallon: It looks like Obama will announce a 10-point immigration plan before Thanksgiving. And you thought your family would have nothing to argue about this year.

Meyers: According to a new report, Detroit, Michigan is the most dangerous city in the country with Oakland, California coming in second. And the third most dangerous was somehow Detroit again.

Conan: A new book claims that Jesus had a wife and two kids. In other words, He suffered even more than we thought.

Meyers: Kobe Bryant missed his 13,418th shot, breaking the record for most shots missed in an NBA career. Said his teammates, "I'm open!"

Conan: Scientists have discovered a virus that lowers the intelligence of people it infects. The virus is called H-1-Kardashian-1.

Meyers: The Secret Service says there have been 40 cases of White House fence-jumping in the last five years. If the trend continues, they're going to take away Joe Biden's Frisbee.

Conan: Obama and Putin were both in China recently. Obama saw Putin and said, "After those midterms, it's nice to finally see a friendly face."

Meyers: A missing 12-year-old boy was found inside an IKEA store. Searchers said they had plenty of clues but had a hard time putting them together.

Fallon: The city of Paris may start fining people for taking night-time photos of the Eiffel Tower because its light show is copyrighted. That explains France's new tourism slogan: "Go home!"

Conan: Hackers infiltrated the Postal Service's network. The Post Office was shocked about it, and even more shocked that it has a computer.

Meyers: A Florida man got six months in jail for stockpiling weapons just 11 miles from Disney World -- 11 miles from Disney World? So…in the parking lot?

Meyers: The Mormon Church says its founder Joseph Smith may have had 30 to 40 wives. Just to be safe, he began each conversation with "Happy Anniversary!"

Conan: A couple in Florida left their waiter a $1,500 tip. Since it's Florida, the waiter still murdered them.

Conan: Two people in Beaumont, California lined up at Best Buy more than two weeks before Black Friday. They said they are hoping to get a great deal on a life.

Conan: At the economic summit in Beijing, Vladimir Putin was accused of flirting with China's First Lady. You know, Putin does have a history of not respecting boundaries.

Fallon: After 13 seasons, Randy Jackson is leaving "American Idol." He said he wanted to go out with the show on top, but then decided to wait another seven years.

Conan: In Washington, Eminem was criticized for dropping multiple F-bombs during a concert for veterans. It was the first time that soldiers in the military have been exposed to bad language.

Fallon: China celebrates "Singles Day" like an anti-Valentine's-Day where singles buy themselves presents. As we call it in America, Valentine's Day.

Conan: Warren Buffet's company has bought Duracell for $6.4 billion. I think he overpaid, because batteries were not included.

Conan: Some people are saying that Kim Kardashian's nude photo is actually a positive feminist statement. Those people are called "husbands caught looking at it."

Conan: Developers are working on a new app that gives you a 10-second warning before an earthquake. The app is called, "Too Late."

Conan: The European Space Agency Rosetta space probe that landed on that comet 313 million miles away is recording noises that scientists say sound like singing. More amazing, the song is “All About That Bass.”


LITTLE KNOWN FAILURE
PAVLOV'S CAT
RING
RING
RING
RING
RING
RING
RING


24-HOUR CHRISTMAS MUSIC, ALREADY...?
.... GRANDMA GOT RUN OVER BY A REINDEER....
OBJECTS IN MIRROR ARE NOT AS CLOSE AS SOME WOULD HAVE YOU BELIEVE.