VOLUME 41
NUMBER 3
SUMMER 2004

THE M.C. GILL DOORWAY™

HIGH-PERFORMANCE COMPOSITE PRODUCTS SINCE 1945
WWW.MCGILLCORP.COM

Gillcore™ HK Kevlar® Honeycomb

Gillcore™ HK Kevlar® Honeycomb Using DuPont Kevlar N636 Paper

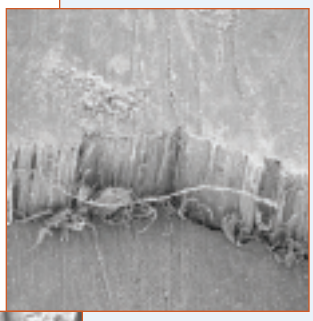
- **Honeycomb Made by M.C. Gill**
- **Major Advance in Aerospace Technology**
- **Potential Weight-Saving Applications**

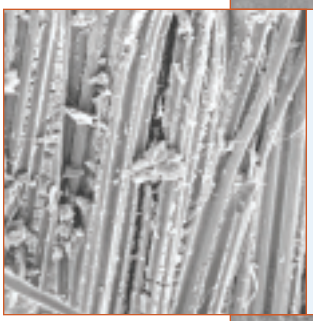
M.C. Gill Corporation began to experiment with early forms of honeycomb, made by outside suppliers, and incorporated them into composite products in the 1960s. This was not long after commercial types of honeycomb were developed during World War II, as a substitute for wood products which were in short supply due to wartime needs.

We began manufacturing our own aramid honeycomb in the 1980s to meet the needs of a growing market while better controlling its quality, schedule and costs.

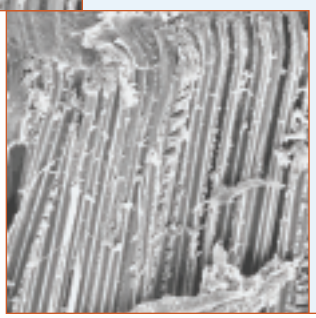
Working with aerospace-grade composite materials, it is essential to continually work toward new, stronger, lighter products that address the needs of the user. The introduction of our Gillcore HK Kevlar Honeycomb can accomplish this by delivering a product with characteristics advanced beyond our well-recognized Gillcore HD Aerospace Grade and Gillcore HA Commercial Grade Nomex™ Honeycomb products. This makes Gillcore HK Kevlar Honeycomb the growing choice for a widening range of uses throughout aviation and into a world of other applications.

KHONEYCOMB





Highly magnified images of Kevlar fibers.



Images courtesy of J.A. Curran and the University of Cambridge.

Kevlar Fiber

Adaptable Manmade Material

Kevlar fiber was developed in 1965 by Dupont research scientists and possesses a significant combination of properties. Kevlar para-aramid fiber consists of long molecular chains produced from poly-paraphenylene terephthalamide. These chains are highly oriented with strong interchain bonding which result in a unique combination of properties. This technology was recognized as having enhanced strength, light weight and flexibility. This led to its introduction in a variety of end-uses, beginning with its commercial introduction in the early 1970s.

One of this material's attributes is that it is offered in a variety of forms, including utilization in the M.C. Gill manufacture of honeycomb. Kevlar fiber is five times stronger than steel on an equal-weight basis, in addition to being lightweight, flexible and comfortable to handle.

GILLCORE HK HONEYCOMB

Gillcore HK Kevlar Honeycomb

As it became clear the Kevlar fiber would provide superior characteristics in composite honeycomb structures, M.C. Gill research and development efforts began in 2000. The goal was to create the next generation of high-performance honeycomb for aircraft interiors, flooring, and fuselage structures. Additionally, it was clear that customers outside aerospace were looking for future materials with enhanced characteristics including corrosion resistance, lighter weight and strength to use in everything from architectural constructions to advanced rail systems to sports equipment.

Since it was introduced, Kevlar Honeycomb has become a lightweight alternative to the industry standard, Nomex Honeycomb, which M.C. Gill continues to produce. Our Kevlar Honeycomb, in contrast to Nomex Honeycomb, offers a typical weight savings of 20% to 30%, which can be a deciding factor in a wide range of applications. Also critical is cost, and Kevlar Honeycomb is a lower-cost alternative to Korex® Honeycomb as well as bias weave fiberglass reinforced honeycomb. These facts continue to bolster Gillcore HK Kevlar Honeycomb's growing appeal worldwide.

Features

- Gillcore HK Kevlar Honeycomb has a phenolic resin coating.
- Most densities can be manufactured using different thicknesses of Kevlar N636 paper to balance cost compared to performance needs.
- This honeycomb is available in hexagonal and over-expanded cell configurations.
- Cell sizes range from 3.2mm (⅛″) to 4.8mm (3⁄16″).

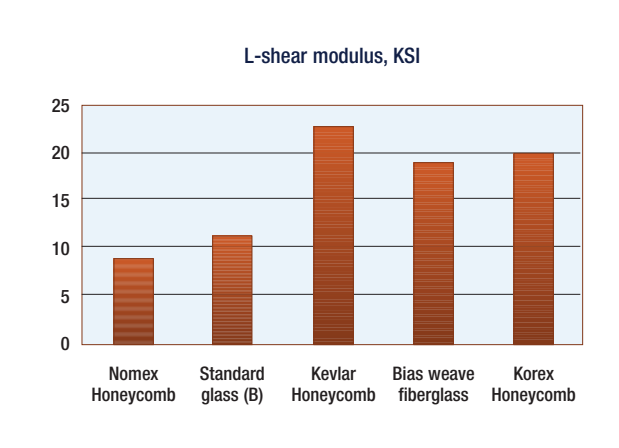
Kevlar N636 Honeycomb Compared to Nomex Honeycomb

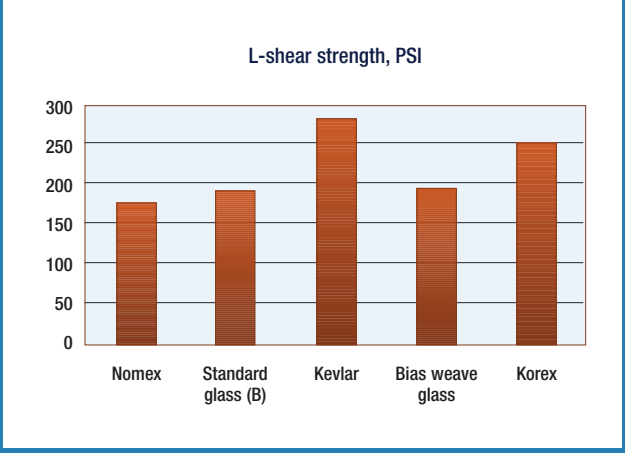
- Exceptional shear strength and modulus.
- Superior durability, fatigue and hot/wet properties.
- Excellent thermal and moisture dimensional stability.
- Improved manufacturing performance.

Core Modulus Comparison

Core Types Compared:

- Nomex Honeycomb ⅛″ – 3.0 pcf
- Standard Glass (B) ⅜″ – 3.2 pcf – Normalized to 3.0 pcf
- Kevlar Honeycomb ⅛″ – 3.0 pcf
- Bias weave glass ⅛″ – 3.0 pcf
- Korex Honeycomb ⅛″ – 3.0 pcf





Weight-Saving Potential
of Gillcore HK Kevlar Honeycomb

A general rule of honeycomb core is that shear properties are primarily a function of the core substrate, and the compression properties are primarily a function of the resin. Replacement of Nomex Honeycomb with lower-density Kevlar N636 Honeycomb is possible because of the higher shear strength and modulus inherent to Kevlar N636 paper.

For applications where shear strength and modulus are the key properties, it is possible to achieve design allowable properties that are equal to or higher than existing Nomex Honeycomb values at a significant reduction in density.

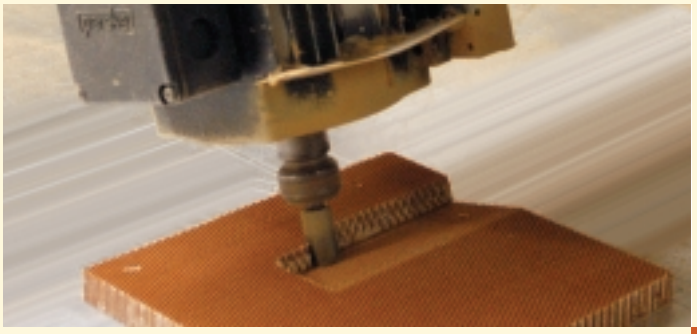
However, if compression strength is the key property, or equally important to the shear property, Kevlar N636 Honeycomb may offer no advantage over Nomex Honeycomb with respect to reduction of weight.

Potential Weight Savings of Gillcore HK Kevlar Honeycomb – (3.2mm cell)

Property	BMS 8-124 Class 4 Type V Requirement	Typical Kevlar Properties	Weight Savings
	1/8 3.0# (3.2-48kg/m3)	1/8 2.5# (3.2-40kg/m3)	16.6%
Stabilized Compression, psi (MPa)	247 (1.7)	276 (1.9)	
L Shear, psi (MPa)	160 (1.1)	247 (1.7)	
L Modulus, ksi (MPa)	5.2 (35.8)	15.0 (103.4)	
W Shear, psi (MPa)	83 (.57)	144 (.99)	
W Modulus, ksi (MPa)	2.8 (19.3)	8.1 (55.8)	
	1/8-4.0# (3.2-64kg/m3)	1/8 3.0# (3.2-48kg/m3)	
Stabilized Compression, psi (MPa)	435 (3.0)	392 (2.7)	25%
L Shear, psi (MPa)	275 (1.9)	261 (1.8)	
L Modulus, ksi (MPa)	9.5 (65.5)	15.6 (107.6)	
W Shear, psi (MPa)	155 (1.07)	142 (.98)	
W Modulus, ksi (MPa)	5.0 (34.4)	8.2 (56.5)	
	1/8 8.0# (3.2-128kg/m3)	1/8 6.0# (3.2-96kg/m3)	
Stabilized Compression, psi (MPa)	1450 (10.0)	1103 (7.6)	25%
L Shear, psi (MPa)	450 (3.1)	566 (3.9)	
L Modulus, ksi (MPa)	15.0 (103.4)	23.6 (162.7)	
W Shear, psi (MPa)	218 (1.5)	316 (2.18)	
W Modulus, ksi (MPa)	7.5 (51.7)	13.2 (91.0)	

Potential Weight Savings of Gillcore HK Kevlar Honeycomb – (4.8mm cell)

Property	BMS 8-124 Class 4 Type I Requirement	Typical Kevlar Properties	Weight Savings
	3/16 3.0# (4.8-48kg/m3)	3/16 2.0# (4.8-32kg/m3)	33%
Stabilized Compression, psi (MPa)	247 (1.7)	218 (1.5)	
L Shear, psi (MPa)	155 (1.07)	160 (1.1)	
L Modulus, ksi (MPa)	5.2 (35.8)	10.2 (70.3)	
W Shear, psi (MPa)	84 (.58)	92 (.63)	
W Modulus, ksi (MPa)	2.8 (19.3)	5.5 (37.9)	
	3/16-4.0# (4.8-64kg/m3)	3/16 3.0# (4.8-48kg/m3)	
Stabilized Compression, psi (MPa)	435 (3.0)	464 (3.2)	25%
L Shear, psi (MPa)	228 (1.57)	261 (1.8)	
L Modulus, ksi (MPa)	7.3 (50.3)	15.2 (104.8)	
W Shear, psi (MPa)	125 (.86)	160 (1.1)	
W Modulus, ksi (MPa)	3.9 (26.9)	8.2 (56.5)	



New Floor Panel Designs Using Kevlar Core Save Weight

These are the criteria we are using to develop a new generation of aircraft floor panels using Gillcore HK Kevlar Honeycomb:

- Meet or exceed mechanical property requirements of current OEM design specifications.
- Achieve maximum attainable weight reductions.
- Support increased insert shear properties for increased insert pitch and elimination of insert potting.
- Achieve the desired product improvements while maintaining competitive pricing.

A380 Super

M.C. Gill Manufactures These Grades of Gillcore HK Kevlar Honeycomb

Gillcore HK Designation	Cell Size	Density	Paper Thickness
HK1061	0.125″ (3.2mm)	2.5 pcf (40kg/m3)	1.4 mil (36µm)
HK131	0.125″ (3.2mm)	3.0 pcf (48kg/m3)	1.4 mil (36µm)
HK132	0.125″ (3.2mm)	3.0 pcf (48kg/m3)	1.8 mil (46µm)
HK142	0.125″ (3.2mm)	4.0 pcf (64kg/m3)	1.8 mil (46µm)
HK2032	0.156″ (4.0mm)	4.5 pcf (72kg/m3)	1.8 mil (46µm)
HK262	0.156″ (4.0mm)	6.0 pcf (96kg/m3)	1.8 mil (46µm)
HK163	0.125″ (3.2mm)	6.0 pcf (96kg/m3)	2.8 mil (71µm)
HK321	0.1875″ (4.8mm)	2.0 pcf (32kg/m3)	1.4 mil (36µm)
HK332	0.1875″ (4.8mm)	3.0 pcf (48kg/m3)	1.8 mil (46µm)

If you have other requirements, contact M.C. Gill Corporation to discuss.

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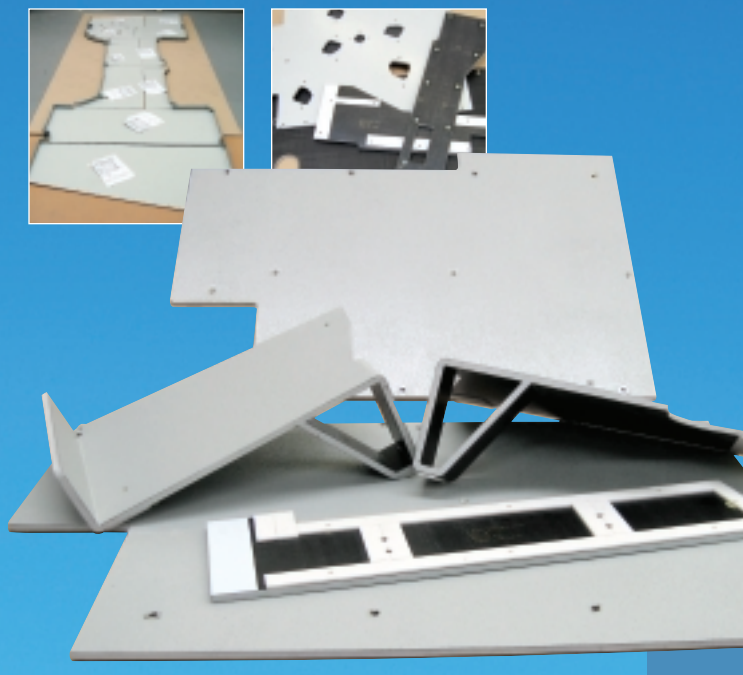
Jumbo Uses M.C. Gill Designed Next-Generation Aircraft Flooring.

Airbus France awarded the design-build contract for the A380 cockpit floors, and Electronic Equipment Bay floors, to M.C. Gill Corporation. Although M.C. Gill has long been supplying a full line of qualified products to Airbus operators, this marks the company's first OEM contract for Airbus aircraft. Raw stock floor panels are produced for the A380 at the company's El Monte, California, headquarters, then detailed at the M.C. Gill Europe facility in Bangor, N. Ireland.

M.C. Gill is known for its innovative research and design capabilities; and we put them to work by quickly responding to the Airbus requirement for a next generation floor panel that is strong, light and cost-effective. These set a new standard for light weight and strength, and represent the entrance into a new era of this type of aircraft component systems.

The super-jumbo A380 is an innovative aircraft and we are excited to be a part of the design-build team. M.C. Gill looks forward to the challenge of delivering an innovative floor system that uses the design flexibility allowed by working with our own carbon skin materials on Kevlar Honeycomb core.

The A380 will seat 555 passengers in a typical three-class layout, and is scheduled to enter service in 2006.



Creating a Composites Merit Badge for the Boy Scouts

Major Gift to Fund Development

Merwyn C. Gill, Chairman of the Board of M.C. Gill Corporation, announced making a major gift to fund development of a Composites Merit Badge for the Boy Scouts of America.

"Working to create a Composites Merit Badge would show thousands of Scouts what Composites are all about, introduce them to these materials and perhaps even interest them in a career in this growing field. There are Merit Badges for many other fields, so it only makes sense to work toward developing one that encourages them to learn about Composites," M.C. said. The announcement was made at Pasadena's Ritz-Carlton Hotel during an event honoring last year's group of 227 Eagle Scouts, including designating them the M.C. Gill Eagle Scout Class of 2003.

The San Gabriel Valley Council, Boy Scouts of America – the fastest-growing council in the United States – is working with M.C. Gill to create the requirements, pamphlet and related materials for the badge. The first phase in this process is meetings with a group of active Scout Leaders, Merit Badge counselors and composites industry experts to outline a development plan. Once the requirements and materials are created they will be tested during the Summer Program at Cherry Valley Boy Scout Camp on Catalina Island. This is the most popular Scout camp in the Western United States, making it an ideal environment for participation.

Once the requirements and materials have been refined, they will be revised and retested in a variety of venues, including a demonstration at the 2005 National Jamboree.

"Once we are certain that it's completely ready to go, we will formally submit the Composites Merit Badge for consideration to the National Boy Scout organization for review," said Bob Booker, Scout Council Executive Director. "After they have had a chance to consider it, we hope that it can become a part of the national program. Learning about Composites will be a positive addition to the program and Scouting appreciates this involvement and support."

Merit Badges have been part of the Boy Scout tradition since Baden-Powell first created the program nearly 100 years ago. First called "Badges of Honor" in British Lieut. General Baden-Powell's popular 1908 book *Scouting for Boys*, Merit Badges have grown in number and become legendary. Over time some Merit Badges have been discontinued and replaced by others with more contemporary content. These often reflect innovations and changes in technology. Orville Wright himself was an advisor to the Aviation Merit Badge. Merit Badges such as Rabbit Raising and requirements to learn Morse Code have been replaced by badges such as atomic energy, environmental science and computers.

BOY SCOUTS OF AMERICA

For additional information or to provide input or support to the project to create a Composites Merit Badge – contact:

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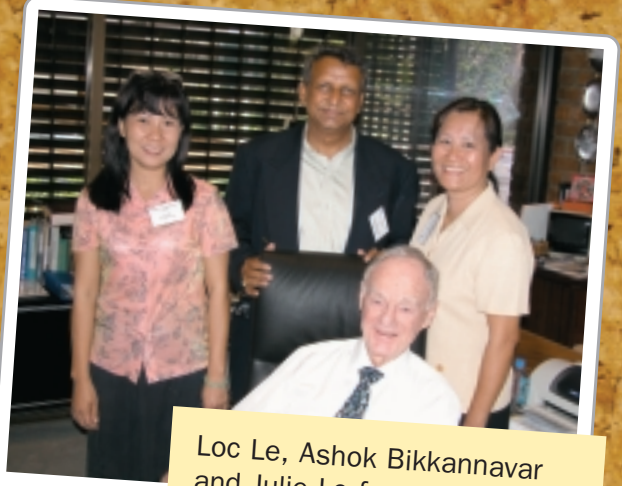
M.C. Gill Eagle Scout Class Named

In response to his support for the Boy Scouts, M.C. was honored with the naming of the Merwyn C. Gill Eagle Scout Class of 2003. The banquet was attended by some 250 Eagle Scouts and supporters. About half of the Eagles had just earned their rank, while the other half were adults who had become Eagle Scouts as far back as the 1930s.

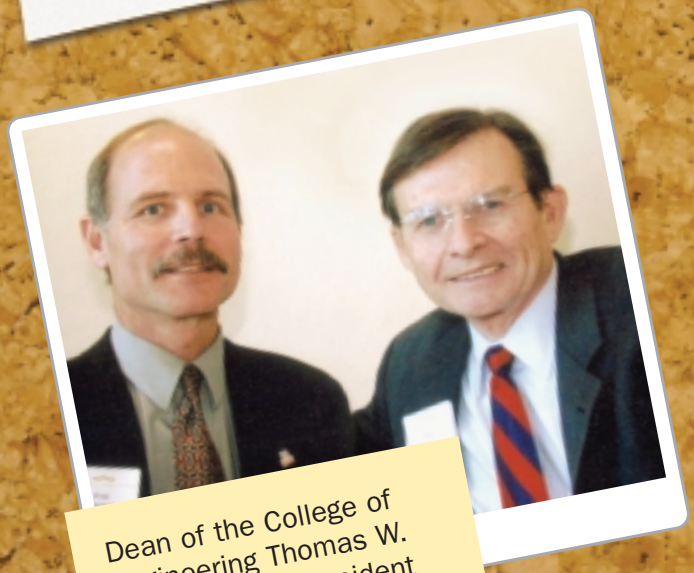
Composites Merit Badge Development Off to an Exhilarating Start!

The San Gabriel Valley Council, BSA held its annual Scout Expo, drawing over 15,000 people in June. Highlight at the event, and winning a Presidential Ribbon, was the Composites Merit Badge Development booth. Some 200 Composites Learning Certificates were laminated by the Scouts, under the supervision of M.C. Gill staff and Scout volunteers. A simple wet lay-up process was used, with a single piece of fiberglass cloth and polyester resin. By learning how Scouts ages 11 through 18 respond to this and future demonstrations, requirements and supporting materials will be developed.

Gillshots



Loc Le, Ashok Bikkannavar and Julie Le from International Stones Warehouse Inc. with M.C.



Dean of the College of Engineering Thomas W. Peterson and President Peter Linkins, University of Arizona visitors.

USC Alumni Merit Award to M.C.
Alumni Merit Awards are given to individuals who have made extraordinary contributions in their chosen fields and have brought recognition to themselves and the university through their actions and achievements. In addition to receiving this award, M.C. was bestowed with an Honorary Trusteeship to the school. Presenting the trophy are Judith Blumenthal and Ann Lipscomb Hill from USC.

M.C. Gill to Receive ACMA's Lifetime Achievement Award at Composites 2004

M.C. Gill, who started his composites business as "Peerless Plastic Products" in a small garage in Los Angeles in 1945, was recently voted by the American Composites Manufacturers Association's Board of Directors as their Lifetime Achievement Award winner for 2004. The award will be presented in Tampa, Florida, at COMPOSITES 2004 in October.

"The board felt that it was time to honor M.C. Gill and the long list of accomplishments he can check off for the industry," said ACMA Executive Director Missy Henriksen. "He is certainly one of the early pioneers in composites and started out as many of our entrepreneurs did, in a small garage or barn mixing resin and making parts. The rest of his story is part of manufacturing and materials science history for the last century."

The M.C. Gill Corporation, as it is now known, has grown to be the world's largest manufacturer of original equipment and replacement baggage compartment liners for passenger and freighter aircraft. M.C. Gill also is one of the largest producers of composites sandwich panels used in the aircraft industry.

"Mr. Gill will carry the torch well," adds Henriksen. "He is in good company. ACMA's past winners include Robert Morrison, Brandt Goldsworthy, Everett Pearson, Wes Hoch and Don Aker. The criteria for this award is very high, and includes significant contributions to the composites industry."

M.C., as he is known, is almost 94, grew up in Iowa and moved to California in 1933. He earned a degree in chemistry in '36 and chemical engineering in '37 from the University of Southern California, where he has since donated more than $8 million to the now "Merwyn C. Gill Foundation Composites Center." At one time, he could barely scrape together $40 a month for rent on the garage that housed Peerless Plastic.

The M.C. Gill Group of Companies

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Alcore does not sell sandwich panels. Contact M.C. Gill for these products.

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THE DOORWAY IS PRINTED ON 10% POST-CONSUMER RECYCLED PAPER AND SHOULD BE RECYCLED

Trivia

President John Quincy Adams owned a pet alligator which he kept in the East Room of the White House.

★ ★ ★

At President Andrew Jackson's funeral in 1845, his pet parrot was removed for swearing.

★ ★ ★

Goethe couldn't tolerate the noise of barking dogs and could only write if he had a rotting apple in the drawer of his desk.

★ ★ ★

In Jonathan Swift's book *Gulliver's Travels,* Chapter 3 of *A Voyage To Laputa*, reads: "They have likewise discovered two lesser stars, or satellites, which revolve about Mars, whereof the innermost is distant from the centre of the primary planet exactly 3 of his diameters, and the outermost 5″. Interestingly, *Gulliver's Travels* was published in 1726 and Mars' two moons were actually discovered by U..S astronomer Asaph Hall in 1877.

★ ★ ★

The shortest war in history was between Zanzibar and Great Britain in 1896. Zanzibar surrendered after 38 minutes.

★ ★ ★

In Shakespeare's play "Julius Caesar" there is a reference to a clock striking.

Clocks did not appear until at least a thousand years after Caesar's death.

★ ★ ★

Bank robber John Dillinger played professional baseball.

★ ★ ★

Physicist Murray Gell-Mann named the sub-atomic particles known as quarks for a random line in James Joyce, "Three quarks for Muster Mark!"

★ ★ ★

Mel Blanc – the voice of Bugs Bunny – was allergic to carrots.

★ ★ ★

A pregnant goldfish is called a *twit.*

The Funny Side

"I have not failed. I've just found 10,000 ways that won't work" – **Thomas Edison**

★ ★ ★

"Laughter is a tranquillizer with no side effects."
– **Arnold Glasgow**

★ ★ ★

Bob had proposed to young Betty, and was being interviewed by his prospective father-in-law.

"Do you think you are earning enough to support a family?" the older man asked the suitor.

"Yes, sir," replied Bob, "I'm sure I am."

"Think carefully now," said Betty's father. "There are twelve of us..."

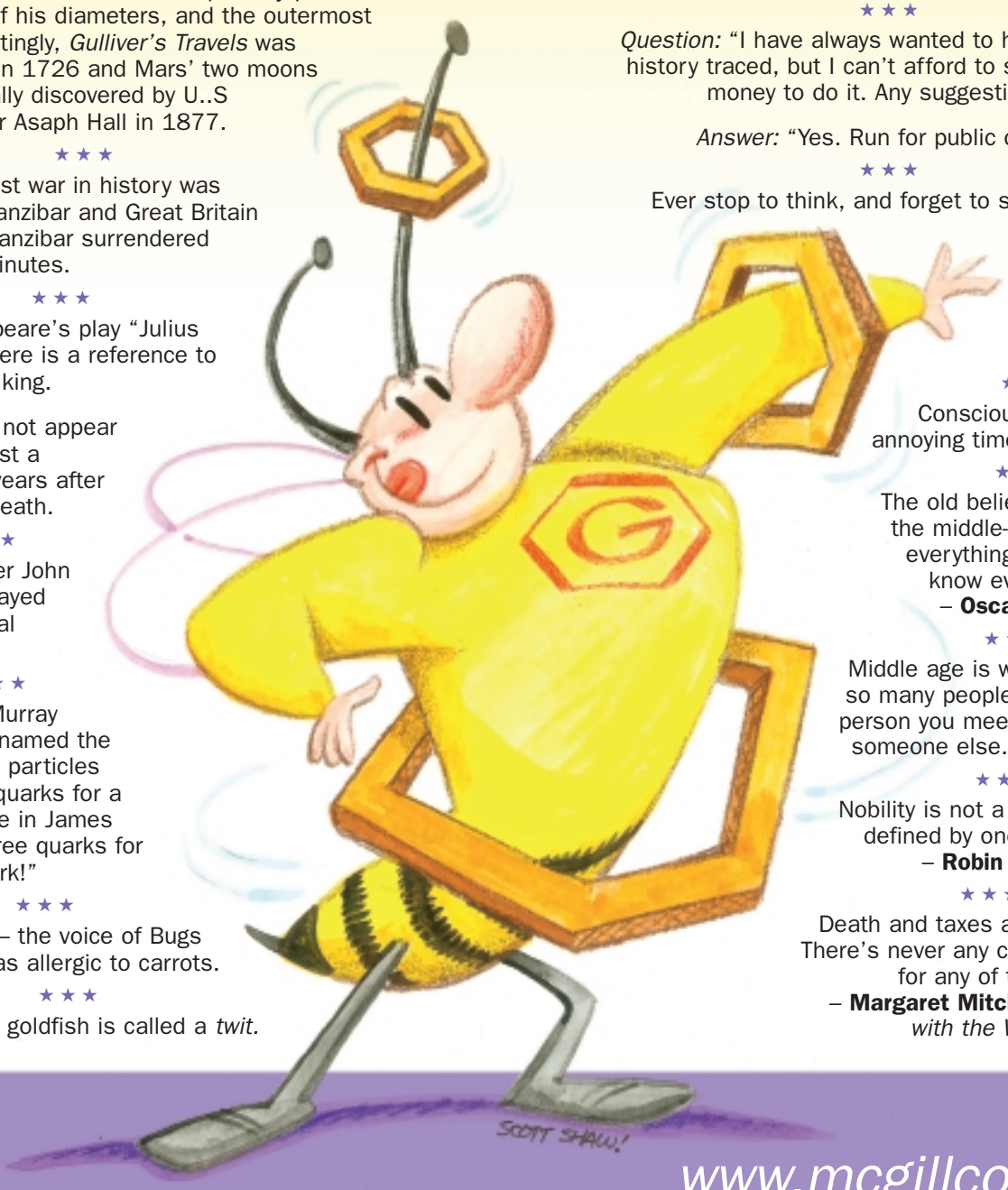
★ ★ ★

Question: "I have always wanted to have my family history traced, but I can't afford to spend a lot of money to do it. Any suggestions?"

Answer: "Yes. Run for public office."

★ ★ ★

Ever stop to think, and forget to start again?



★ ★ ★

Consciousness: That annoying time between naps.

★ ★ ★

The old believe everything; the middle-aged suspect everything; the young know everything.
– **Oscar Wilde**

★ ★ ★

Middle age is when you've met so many people that every new person you meet reminds you of someone else. – **Ogden Nash**

★ ★ ★

Nobility is not a birthright. It is defined by one's actions.
– **Robin Hood**

★ ★ ★

Death and taxes and childbirth! There's never any convenient time for any of them.
– **Margaret Mitchell** in *Gone with the Wind*