Facial beauty may lie more than skin deep

A beautiful face exerts its allure on people regardless of culture, thanks largely to an evolutionarily designed preference for certain facial features, three psychologists assert in the March 17 NATURE.

Moreover, the shape of the most fetching faces differs in important ways from the average shape of all faces in a population, contend David I. Perrett and Keith A. May, both of the University of St. Andrews in Fife, England, and Sakiko Yoshikawa of Otemon Gakuin University in Osaka, Japan. This conclusion contrasts with that of another study, which places averageness at the center of facial attractiveness (SN: 5/12/90, p.298).

"An average face shape is attractive but may not be optimally attractive," Perrett holds. "The preference for nonaverage face shapes may have created [evolutionary] selection pressures that moved the most attractive faces away from the population mean."

Perrett's group finds that men and women in Japan and Great Britain prefer the same composite faces generated from individuals already rated as highly attractive.

An initial composite came from pictures of 60 white British women between 20 and 30 years old. A computer fashioned an "average" image from measures of the shape and position of 224 anatomical features on each face. A second composite represented the average of 15 of those faces given the highest attractiveness ratings by 36 male and female British adults. A third computer-derived face served as a caricature of the second image by exaggerating differences between it and the first composite.

Nearly all of a second set of 36 comparable volunteers rated the second image more attractive than the first and the caricature as more appealing than the second composite.

Perrett's team then generated the same three types of composites from the faces of 342 Japanese women age 18 or 19. In tests with 26 Japanese and 36 British men and women, the caricature again garnered the highest attractiveness ratings, followed by a composite of the 16 most attractive individuals.

Another 30 British volunteers similarly rated composites of British male faces, the scientists report. An "attractive" male composite and its caricature yielded comparably high ratings.

Highly attractive male and female composites share some common traits, Perrett says, such as larger eyes relative to face size and shorter distances from mouth to chin and from nose to mouth.

The results coincide with research directed by Michael R. Cunningham of the University of Louisville (Ky.). Cunningham argues that truly beautiful faces display atypical features (SN: 10/12/91, p.234).

The Louisville psychologist theorizes that five categories of human facial features have evolved: childlike traits, which foster others' trust; indicators of sexual potency; signs of aging, which denote wisdom; friendliness signals, such as a large smile; and grooming features that draw others closer.

Some categories prove more accessible to individual manipulation than others, Cunningham asserts.

The average of all facial features in a population provides the fundamental building block of facial beauty, counters Judith H. Langlois of the University of Texas at Austin. Humans may have evolved to view an extremely "average" face as closer to a prototype, or best example, of attractiveness, adds Lori A. Roggman of Utah State University in Logan. They reject the division of facial attractiveness into separate categories.

Whatever the case, "the assumption that beauty is an arbitrary cultural convention may simply not be true," writes Nancy L. Etcoff, a neuropsychologist at Harvard Medical School in Boston in a comment accompanying the new report.

—B. Bower

Two teams find second colon cancer gene

Two reports show how the quest for *the* gene for an inherited disorder can lead to a multilab genehunt yielding several defective pieces of DNA.

Last December, geneticists pinpointed a gene on chromosome 2 as the cause of hereditary nonpolyposis colorectal cancer, which affects up to 1 in 200 people in the United States (SN: 12/11/93, p.388). Now, geneticists realize that a second defect, this one on chromosome 3, accounts for about 25 percent of these cancer cases, says Kenneth W. Kinzler of the Johns Hopkins Oncology Center in Baltimore.

Based on studies of DNA repair in microbes, researchers knew that both genes code for proteins that correct mistakes in new DNA. "[They work] like a spell-checker," explains R. Michael Liskay, a geneticist at the Oregon Health Sciences University in Portland. Misspelled DNA leads to mutations that can affect how well the proteins encoded by that DNA function.

To search for genetic perpetrators of colorectal cancer, Kinzler, Bert Vogelstein, and Nickolas Papadopoulos of Johns Hopkins and their colleagues looked for matches between human genes and the yeast or bacterial genes involved in this kind of DNA repair.

They found three such genes, one each on chromosomes 3, 2, and 7. They focused first on the gene on chromosome 3 because of evidence linking it to some families with this type of cancer. In 9 of 10 families evaluated, the researchers located this gene and showed it leads to a truncated repair protein, they report in the March 18 SCIENCE.

Liskay and others had demonstrated that yeast and bacteria require this protein and at least two others to correct genetic mistakes. In particular, these proteins fix errors in which pairs or triplets of DNA building blocks repeat more times than they should.

Because people with colorectal cancer tend to have repeats, Liskay surmised that they would have a defective counterpart of yeast's repair genes. In the cancer-ridden family, one DNA building block substitutes for another in that gene, Liskay and his colleagues report in the March 17 NATURE. Their gene is the same as Kinzler's.

Both teams expect to find other defective genes that lead to colorectal cancer. "It's a very common disease, but it's genetically heterogeneous," says Liskay. That heterogeneity could complicate the development of diagnostic tests.

—E. Pennisi

This fat may fight cancer several ways

A provocative new animal study suggests that early consumption of a fat contained in many animal products may offer some protection against breast cancer. Related research indicates that high amounts of this fat may also help fight a wasting disease that compromises the survival of many sick individuals, including cancer patients.

Known as conjugated linoleic acid (CLA), this unusual fat is a structurally altered form of the essential polyunsaturated fat, linoleic acid. In the March 1 CANCER RESEARCH, biochemist Clement Ip of the Roswell Park Cancer Institute in Buffalo, N.Y., and his colleagues report that diets enriched with CLA reduced a female rat's susceptibility to two breast carcinogens.

In one case, CLA administered just during the 5 weeks when a rat's mammary tissue was maturing offered strong protection against the development of tumors later, when the researchers exposed the animal to one of two potent chemical carcinogens. Animals whose diets contained 1 percent CLA by weight — the equivalent of about 30 times the amount eaten by the average 155-pound human — developed just two-thirds as many mammary cancers as rats given no CLA.

In another experiment, the diets of nearly mature females were spiked with 0.5 to 0.05 percent CLA for 38 weeks, beginning just 2 weeks before a single dose of a chemical carcinogen. Though animals in the group receiving the highest dose developed less than half as many mammary tumors as untreated rats, even those receiving the least CLA showed evidence of protection: They developed just 78 percent as many cancers as untreated animals.

Concludes Ip's team, "CLA is by far the most powerful naturally occurring fatty acid known to modulate [tumor formation]."

"What makes this really amazing is that [the lowest active dose] is within the range of what people can eat," says Michael W. Pariza, director of food microbiology and toxicology at the University of Wisconsin-Madison.

First isolated 10 years ago from hamburger, CLA now appears "to be present in any warm-blooded animal," notes Pariza, one of CLA's discoverers. Studies he has headed indicate that the highest concentrations of CLA occur in red meats, turkey, milk, and cheese (SN: 2/11/89, p.87).

But before people use the new findings to sanction pigging out on bacon, heavy cream, and high-fat cheeses, Ip urges caution. CLA keeps company with some unhealthful companions. Not only do animal products tend to carry high proportions of saturated fats and cholesterol – risk factors for heart disease – but they also contain CLA's parent, linoleic acid. Excessive quantities of linoleic acid have been associated with fostering cancer development.

If CLA continues to prove promising, Ip suspects manufacturers will respond by chemically or microbially treating foods to convert more of their ordinary linoleic acid into CLA.

Research by Pariza's team now suggests that CLA may also prove beneficial in treating cachexia, a wasting that occurs when the body catabolizes – burns up – muscle in an attempt to meet the high energy demands of fighting certain chronic diseases, such as malaria or cancer.

The Madison-based researchers fed some mice and chickens normal diets; others got diets supplemented with 0.5 percent of either fish oil or CLA. After a week or two, all animals received an injection of a bacterial poison that induces temporary cachexia. Untreated animals and those supplemented with fish oil suffered twice the weight loss of animals supplemented with CLA, Pariza and his coworkers report in the Feb. 28 BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS.

Even more important, Pariza points out, in contrast to several other promising treatments being considered for cachexia, "CLA reversed the catabolic effects without suppressing the immune system." Indeed, he says, these new data suggest "that CLA really is a growth factor – a nutrient that hasn't been previously identified." He now suspects that CLA achieves its many beneficial effects through some common pathway involving hormonelike substances in the body known as prostaglandins. *– J. Raloff*

Map of Mars helps solve a dark mystery

A new perspective on old images of the Red Planet may provide planetary scientists with a better understanding of several Martian features, including a vast dark region that has puzzled researchers for decades.

Astronomers have long speculated about the processes that formed and preserved Cerberus, a dark, gently sloping region just north of the Martian equator that has roughly half the width of the United States. Many areas of Mars are coated with a highly reflective layer of fine dust and appear bright red.

But Cerberus remains dark, its whale-shaped silhouette contrasting with its bright surroundings. And unlike other dim areas of Mars, Cerberus has no obvious origin. For example, it is not a depression, which could trap dark sand.

Researchers have suggested two theories for the creation of Cerberus' dim countenance. In one scenario, a wind of sand particles periodically scours this section of the Martian surface, removing dust and exposing the dark, underlying bedrock. In the second scenario, sand blankets the area instead of scouring it, forming a dimly reflective surface akin to the black sand beaches of Hawaii. But each proposal poses the same puzzle: Where does the sand come from?

A new global map of Mars, based on pictures taken by both Viking Orbiters between 1976 and 1980, should help solve the riddle. To better study the reflectivity and geology of Mars' surface, Alfred S. McEwen, Laurence A. Soderblom, and their colleagues at the U.S. Geological Survey in Flagstaff, Ariz., used computer technology to combine two types of images taken by the Orbiters.

One set of images, recorded with red and violet filters when the sun stood almost directly overhead, best reveals the color and reflectivity of the surface. However, the flat, overhead lighting makes it difficult to discern topography. In contrast, the other image set – recorded when the sun was low in the sky – has many more shadows, a feature that accentuates the shape and height of the Martian terrain. However, the sun's illumination angle obscures the color and reflectivity of the surface.

Merging the two image sets, a feat that required the processing of some 5,000 pictures, "provides the best of both worlds," McEwen says.

At the annual Lunar and Planetary Science Conference in Houston this week, his team displayed the fruits of their labors: a planetwide map of Mars that reveals both color and topography.

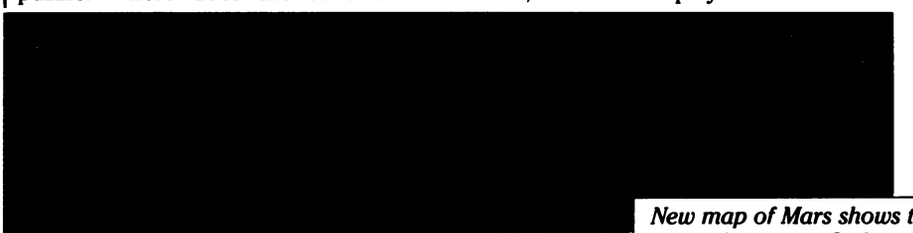
The map sheds new light on dim Cerberus. Researchers already knew from the orientation of bright and dark streaks that prevailing winds blow across the region from northeast to southwest. This suggests that if a source of dark sand exists, it lies in Cerberus' northeast region, McEwen says.

That's intriguing, he adds, because the northeast section has a terrain unlike any other part of Cerberus. The new map shows that this section consists of knobby remnants of ancient highland crust that stick out above a lava flow. The lava indicates past volcanic activity there.

A large body of evidence now suggests that Mars' highland crust contains the planet's major reservoir of water, stored as ground ice since an earlier, wetter epoch on the planet. When a volcano erupts near such a reservoir, the lava slams into the storehouse of ice, causing small explosions, McEwen notes.

The explosions create a glassy material known as palagonite, an excellent source of dark, sand-size material, he adds. Thus, suggest McEwen and his colleagues, a thick deposit of palagonite in the northeast corner of Cerberus appears to have created the entire 2,000-kilometer-long dark region.

With the mystery of Cerberus' formation most likely solved, McEwen says he and his team look forward to comparing their maps to those expected from future missions to the Red Planet, including NASA's Mars Surveyor. *– R. Cowen*



U.S. Geological Survey

New map of Mars shows the dark region known as Cerberus, including section of ancient highland crust (arrow).