Biomedicine

Parasitic strategy for poison control

Humans aren't the only organisms with elaborate waste-disposal systems. The malaria parasite *Plasmodium falciparum* has an unusual way of protecting itself from a toxic by-product of its voracious lifestyle in the human bloodstream, researchers report in the January PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.88, No.2). As scientists unravel the molecular details of this mechanism, they may gain a better understanding of how today's antimalaria drugs work, and perhaps develop more effective treatments.

The single-celled *P. falciparum* feasts on an oxygen-carrying pigment called hemoglobin, sapping red blood cells of more than half their hemoglobin supply. But this hearty fare harbors a poisonous ingredient: the iron-rich heme portion of the hemoglobin molecule, which the parasite's digestive process cannot break down. Heme can kill the organism by chemically smashing open its membranes, but *P. falciparum* avoids that fate by converting heme into a nontoxic pigment called hemozoin, which causes the brown discoloration of the liver, spleen and brain in people with severe malarial infection.

Some scientists have suggested that the parasite accomplishes this conversion by using proteins to sequester the heme. Not so, says biochemist Andrew F.G. Slater of Rockefeller University in New York City.

He and his colleagues discovered that the parasite makes its hemozoin by stringing together heme molecules through a link between the central iron atom of one heme and one of two carboxylate ions sticking off one side of the next heme. They theorize that *P. falciparum* produces enzymes that expedite this bonding process, which would otherwise require enormous amounts of chemical energy. Identifying those enzymes might enable chemists to design antimalaria drugs that interfere with their action, Slater says.

Scientists still don't fully understand the action of two of today's major antimalaria drugs, quinine and chloroquine, he adds. They do know, however, that these drugs target the parasite's digestive organ, or food vacuole. Since hemozoin synthesis also occurs in the vacuole, Slater theorizes that the drugs interfere with hemozoin formation, in effect fighting *P. falciparum* through food poisoning.

Suicidal seniors: Deadly serious

Elderly people who attempt suicide appear more intent on succeeding than their younger counterparts, according to a retrospective study described in the January ARCHIVES OF INTERNAL MEDICINE.

Using records spanning 13 years of psychiatric consultations at the University of Louisville (Ky.), psychiatrist Robert L. Frierson compared reports on 95 people aged 60 to 90 with reports on 1,630 people aged 16 to 59, all of whom had survived suicide attempts. He found older individuals more likely than younger ones to be male and to have used a highly lethal means of attempting suicide, such as a shooting themselves in the head. People in the older group said they had planned their suicide attempts as much as several months in advance, while younger attempters often acted more impulsively, in many cases immediately after an argument, Frierson reports.

Elderly people mentioned ill health, loneliness and bereavement as reasons for their suicide attempts more often than younger people, who typically cited factors such as marital problems, unemployment and financial difficulties.

A 1978 study showed that one-third to one-half of elderly men and women who committed suicide had visited a physician within seven days of their death. Frierson and colleagues reason that studies of elderly men and women who have survived suicide attempts may help physicians become more alert to suicidal warning signs displayed by older patients.

Earth Sciences

Global quick-freeze

Accumulating evidence suggests that Earth's climate did a giant double-take as it thawed from the last ice age, a time when huge glacial sheets covered parts of North America, Europe and Asia. After an initial warming beginning about 15,000 years ago, the entire globe apparently slipped back into a temporary cold spell called the Younger Dryas period that started about 11,000 years ago and ended 1,000 years later.

Climate experts have long thought the Younger Dryas cooling affected only the North Atlantic region, and they have suggested various mechanisms to explain such a regional cooling. But recent evidence from other parts of the globe indicates that the entire world underwent some sort of climate shift during the Younger Dryas. The finding forces scientists to consider a global explanation for the geologically quick chill, say German researchers who report the new data in the Jan. 31 NATURE.

The team found evidence for worldwide changes in sediment cores collected from the Sulu Sea, which lies between the Philippines and Borneo. Measurements of oxygen isotopes in the cores reveal that the surface waters of the Sulu Sea slipped back toward ice age conditions sometime around 10,800 or 11,065 years ago. The isotope shifts suggest the water in this area cooled by 3°C or became less salty, or both. At around the same time, cool-water plankton species populated this subtropical region.

The evidence from the Sulu Sea fits with other recent findings from the Gulf of Mexico, the North Pacific Ocean and Argentina. As an explanation for the apparently worldwide changes, the German researchers suggest a reverse greenhouse effect caused by a drop in the atmosphere's carbon dioxide concentrations. A slowdown in the melting of the glacial ice caps could have stimulated plant growth in the oceans, which in turn would have absorbed carbon dioxide from the atmosphere, they propose.

Schism in the house of reptiles

Most people know that snakes, lizards, crocodiles and turtles fit together under the category of reptile. But new evidence about the ancestry of turtles suggests that these armored animals come from evolutionary stock very different from that of other reptiles, a finding that challenges standard beliefs about reptile origins.

Paleontologists trace reptilian history back to an ancient group of animals called captorhinids, which lived during the Permian period from around 280 million to 250 million years ago. Taxonomists have traditionally tossed turtles and tortoises in with the other reptiles, linking them all to the captorhinids. Yet scientists actually know little about the evolutionary history of turtles prior to 200 million years ago, the age of the oldest known turtle fossil.

In the Jan. 24 NATURE, Robert R. Reisz and Michel Laurin challenge the captorhinid connection, proposing instead that turtles and tortoises more closely resemble an ancient group of land creatures called procolophonids. The researchers, both at the Erindale Campus of the University of Toronto, base their hypothesis on an examination of two recently discovered specimens of a primitive procolophonid called *Owenetta*, found in 245-million-year-old rocks from South Africa. They note that turtles share substantial anatomic similarities with *Owenetta*, indicating a close relationship between the two groups. Reisz and Laurin do not believe turtles evolved directly from *Owenetta*; rather, they suggest that the first turtles and *Owenetta* are more like cousins descended from an unknown common ancestor, which presumably lived several million years before *Owenetta's* time. If true, this theory suggests that turtles do not share close ties with other living reptiles.