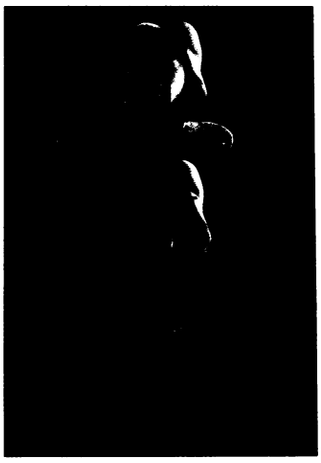
Biology

The fastest jaw in the West

The blink of an eye is as slow as molasses compared to the bite of the trap-jaw ant. Eyelids can take a third of a second to shut and open. But the jaws of at least one species of these specialized ants, *Odontomachus bauri*, work 1,000 times as fast, says Wulfila Gronenberg, a neurobiologist at the University of Würzburg in Germany. The fastest strike observed took 0.33 millisecond (ms), beating out other record movements such as the release of stingers by hydrozoans (jellyfish) at 0.5 ms or the escape jump of click beetles at 0.6 ms.



Gronenberg *et al.*/SCIENCE

Head with open (top) and shut (bottom) jaws.

The group studied ants fixed in position from their middle segment back. In addition to filming the jaws, the scientists traced the nerves involved and projected the view of this motion through a microscope onto a screen, where they could monitor the movement with sensitive photo cells, Gronenberg explains. Those measurements show that the jaws reach a peak speed in mid-snap, then slow down, perhaps to protect the jaws in case they collide.

These ants came from Arizona, but their relatives populate warm regions throughout the western hemisphere.

The ants approach prey with their 1.8-millimeter-long jaws cocked wide open, says Gronenberg. They first detect prey with their antennae, then jerk forward so that the target rubs against the ants' 1-mm-long "trigger" hairs, two of which are located along the edge of each jaw. This contact causes the jaws to snap shut, Gronenberg's team reports in the Oct. 22 SCIENCE.

He and Würzburg colleagues Jürgen Tautz and Bert Hölldobler discovered that these hairs are touch-sensitive nerve endings. Using special stains, the researchers traced these endings back to nerve cells. Very large fibers, or axons, extend from these nerve cells to the part of the insect's brain that controls the mouth.

"The whole system works as a single unit," says Gronenberg. Touching any one trigger hair sets off both jaws. The large diameter of the axons indicates that they transfer information very quickly. Motor nerves that reach from the brain to the jaw muscles lie right next to these axons, suggesting that they connect with the axons, creating a direct reflex.

These motor nerves activate muscles that may release the joints that have kept the jaw open, says Gronenberg. The team observed that the big "closer" muscles are active electrically before the jaws snap but not during the motion. "This is like the cocking of a spring, like a catapult," Gronenberg explains. Apparently, a smaller muscle rotates a jaw joint to release the energy stored in the closer muscles and snap the trap.

More of Hades Creatures

Oil recovered from 3,000 meters beneath Alaska and the North Sea has yielded specialized bacteria capable of thriving in 100°C temperatures and pressures of about 450 atmospheres, evidence that life on Earth may include life deep inside Earth as well, concludes Karl O. Stetter of the University of Regensburg in Germany. The microbes do not need oxygen and produce hydrogen sulfide, Stetter's group reports in the Oct. 21 NATURE. He suspects that seawater injected into the fields to recover more oil introduced the bacteria to this environment.

Biomedicine

Aspirin's safety in pregnancy questioned

A new study fails to support the belief that aspirin can safely prevent high blood pressure during most pregnancies.

Previous research had indicated that daily aspirin use could prevent preeclampsia — dangerously high blood pressure that can occur during gestation — in pregnant women at high risk of this condition (SN: 7/13/91, p.22).

Those results led some doctors to prescribe a baby aspirin a day for pregnant patients, even those at relatively low risk of the hypertensive disorder. Despite that trend, no one had ever studied aspirin's safety and efficacy in these low-risk pregnancies.

The new research, detailed in the Oct. 21 NEW ENGLAND JOURNAL OF MEDICINE, suggests that the risks of aspirin use may outweigh any blood pressure benefits — at least for most pregnant women.

A team of investigators at medical centers across the country randomly assigned 3,315 healthy women pregnant with their first child into two groups. Women in one group received a low dose of aspirin (approximately one baby aspirin) each day, while volunteers in the control group got dummy pills.

The researchers then monitored the pregnancies, checking each recruit's blood pressure and urine samples.

The team discovered that preeclampsia occurred 4.6 percent of the time in the aspirin group and 6.3 percent of the time in the control group. They concluded that aspirin did lower the risk of preeclampsia, but the benefit was small.

Aspirin's value appeared to be limited to one very specific group of women — those who had entered the study with a systolic blood pressure that was slightly elevated although still within the normal range.

For most women, aspirin proved far from risk-free. The team found that women in the aspirin group faced an increased risk of *abruptio placentae*, a life-threatening condition for mother and fetus in which the placenta separates from the uterus.

"Based on our results in this study . . . we recommend that low-dose aspirin not be used as a prophylactic in first-time pregnant women," says study coauthor Robert C. Cefalo of the University of North Carolina at Chapel Hill.

Seedy remedy for rheumatoid arthritis?

A fatty acid extracted from certain plant seeds may help ease symptoms of rheumatoid arthritis, an autoimmune disorder characterized by inflamed and painful joints.

Researchers know that certain fatty acids combat inflammation. Rheumatologist Lawrence J. Leventhal of the University of Pennsylvania's Graduate Hospital in Philadelphia and his colleagues focused on gammalinolenic acid, a fatty acid found in oil extracted from the seeds of the evening primrose or borage plants.

In a six-month double-blind trial, the researchers gave capsules containing gammalinolenic acid to 19 people with rheumatoid arthritis. Eighteen others with the disease, randomly assigned to a control group, received placebo capsules.

"We saw that patients who got the active compound had less pain and less sign of inflammation," Leventhal says. By contrast, the control group showed worsening disease activity or no improvement during the course of the study. The researchers describe their results in the Nov. 1 ANNALS OF INTERNAL MEDICINE.

Although the team found no adverse side effects associated with gammalinolenic acid in this study, the compound's safety has not been proved in a large-scale trial, Leventhal cautions. Rather than rush out to health food stores to purchase primrose or borage seed oil, he advises, people with rheumatoid arthritis should rely on proven treatments for this condition.