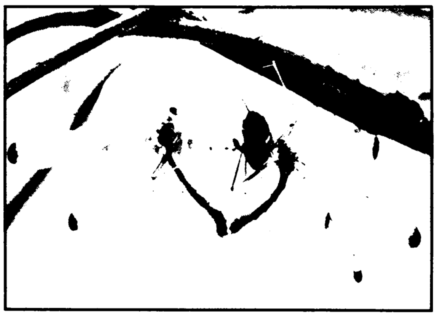
The 'sting' of transvestite flies

What do you say about a male scorpionfly *(H. apicalis)* who impersonates female flies, in order to steal food and females from other males? That he's a thief — a scoundrel, if you will — who hoodwinks "straight" males out of their food for his own lustful and gluttonous ends? Or that he's simply a streetwise survivor, to be admired for his knack of living the good life in the treacherous jungle of insect society?

Whatever one's opinion, it now seems clear that this roguish brand of transvestite fly eats better, has sex more often and probably lives longer than most other males of his species. But he does so at the expense of those unsuspecting males, just when they themselves are primed for sexual intercourse with a female.

According to University of New Mexico biologist Randy Thornhill, the "sting" of the transvestite fly works this way: A "normal" male scorpionfly, after having gone through much time and danger capturing an arthropod, displays his prey as an enticement to passing females. If a female is impressed with the prey, she feeds on it and consents to intercourse, feeding throughout copulation.

But male and female scorpionflies look very much alike — apparently even to other male scorpionflies. So, when a male *H. apicalis* comes fluttering up, lowers its wings and moves its abdomen in a way peculiar to a receptive female, the interested male can hardly be blamed for offering his prey in hopes of a relationship. It is



Randy Thornhill/Science

Female scorpionfly (right) feeds on arthropod prey while copulating with male.

at this point — before the advent of any actual genital contact — that the posing transvestite attempts to snatch the prey away from his surprised victim and abscond in search of a female of his own.

Transvestites are successful in this venture 22 percent of the time, according to Thornhill, who has studied such behavior meticulously among marked scorpionflies. In the rest of the attempts, the would-be victims either do not fall for the ruse or manage to hold on to their prey during the struggle. Rather than turn to female impersonation, another type of pirating male attempts to forcefully swipe the prey from an exhibiting male, sometimes even while he is copulating with a female; this tactic is successful 14 percent of the time.

"Transvestism ... is clearly adaptive," Thornhill reports in the July 27 SCIENCE. It not only provides the successful thief with more eating and copulation opportunities, but it reduces by 42 percent the time spent hunting his own prey — an activity that exposes scorpionflies to dangerous predators, primarily web-building spiders. □

Leg 66 confirms accretion theory

"Too good to be true," said one reviewer of the results from the recently completed Leg 66 of the Deep Sea Drilling Project. Indeed, the drilling samples collected by scientists aboard the *Glomar Challenger* from eight sites off the shore of Mexico, 70 miles southeast of Acapulco, give a solid thumbs up to an accepted, but previously unproven, theory about the fate of sediments at the junction of two colliding plates, say co-chief scientists J. Casey Moore and Joel S. Watkins.

When two plates meet — in this case the oceanic Cocos Plate is being thrust beneath the continental North American Plate — something must happen to the sediments that have settled atop the down-going plate. Conceivably, the thick accumulations could be carried with the down-going plate and remelted in the earth's interior, but most researchers don't believe this happens. For one thing, when material emerges from the earth's interior — in the form of volcanic lava — its composition is far different from that of ocean sediments. The "accretion theory" — first proposed in 1974 — suggests instead that the soft sediments are scraped off the down-going plate like butter off a knife and plastered to the edge of the over-riding plate, forming, in this case, the continental margin and slope of Mexico.

The samples from Leg 66 "bore that [theory] out more than any other drilling has," says Moore of the University of California at Santa Cruz. The *Challenger*'s team found that the age sequence of the sediments on southern Mexico's continental margin was reversed and increased in age landward. Instead of the youngest-on-top, oldest-on-bottom sequence expected, the youngest rocks were found on the bottom of the continental slope, indicating that they were left behind as the Cocos Plate traveled downward beneath the older deposits. By comparing the amount of sediments actually deposited with the estimated amount that should have accumulated, the researchers calculate that slightly more than half the sediments are accreted and the remainder are carried beneath, and possibly "underplated" on, the continent.

Previous attempts to find such evidence have failed, say Moore and Watkins, because similar subduction zones are much more complex. The Cocos-North American Plate junction is young — about 8 or 10 million years old — and fairly shallow and easy to drill, unlike the Marianas Trench near Japan. In addition, at other subduction zones the picture is blurred by activities such as sediment sliding and subsidence. "We've only scratched the surface of converging margins," says Watkins of Gulf Oil in Houston, Tex. "This is the simplest ... but it's a significant first step." □

Antarctic ice keeps algae in the dark

They stretched across the lake bottom before him: vast, luxuriant mats of vegetation producing so much oxygen they sparkled with gas bubbles "like a field of diamonds," says Virginia Polytechnic Institute's George M. Simmons Jr. Nearly as remarkable as an underwater diamond field, Simmons, Bruce C. Parker and co-workers had found, beneath 18 feet of Antarctic ice, thick mats of algae prospering in possibly less light than any other known plants on earth.

Earlier research ventures to Antarctica had found the algae — actually communities of several species of blue-green algae and diatoms — growing around the edges of the freshwater Lakes Fryxell and Hoare about 65 miles west of McMurdo Station. "Bottom grabbers" had even picked up the algae from the shallow edges of the lakes where the ice had melted away in the Antarctic summer. But not until Simmons and his team steamed a hole through the permanent ice covering of the lakes during the 1978-79 Antarctic research season, did the researchers realize what a remarkable organism they were dealing with. Beneath 18 feet of permanent ice and 20 feet of water, the researchers found 2-to-4-centimeter-thick mats of the pinkish-orange colored algae. They estimate that the plants grow in light levels one-tenth of one percent of that on the surface (most algae don't grow where light is less than one percent of the surface level); their color indicates the presence of pigments adapted to low light. Their success is all the more remarkable, notes Simmons, because they have only four months — the Antarctic summer — of full sunlight. And the algae aren't just getting by; their virility is evident from the amount of oxygen they produce — so much that, according to Simmons, the supersaturated water "fizzed" when exposed to air. "It's another example of how ... [life forms] adapt to the darndest conditions," he says. In future experiments researchers hope to find how quickly that oxygen supply is depleted during the dark Antarctic winter and to learn more about the algae's pigment adaptation to low light. □