

WARTIME HEALING

BY ROBERTA NEIGER

Technion Professor Helps Kosovar Refugees

On April 6, a two-and-a-half hour flight – and a world away – from Israel, a 75-person Israeli army team touched down in the Macedonian capital of Skopje. Its mission: to offer medical care to the tens of thousands of Kosovar refugees flooding into Macedonia.

From the belly of a half-hollowed out Boeing, and four Hercules transport planes, the Israelis emerged along with an ambulance, truck and forklift, and masses of medical equipment, food and water. The IDF team – well-trained in emergency responses – erected a complete field hospital within 24 hours.

Among the 14 doctors on the team was Rappaport Faculty of Medicine Dr. Moshe Efrat who joined the mission as part of his army reserve duty. An IDF captain, Efrat was chosen for his expertise in both pediatrics and infectious diseases. (See FOCUS March/April 1999). No stranger to refugee

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Technion Prof. Dr. Moshe Efrat examines infant at refugee camp in Macedonia.

JET LAB TAKES OFF

WATER WARNING

GALLSTONES REVEALED

REDUCING ROAD CARNAGE

TOMORROW'S LEONARDOS



Profile of Prof. Ella Lindenbaum on page 4

INTERNET ANTIDOTE

Bugs Improve Robots and Net Tools

BY JILL GARBI

Technion Professor of Computer Science Alfred Bruckstein found encouragement for his ant research in an unlikely source, the Bible. "Go to the ant, thou sluggard," proclaims Proverbs 6:6. "Consider her ways, and be wise."

Bruckstein and fellow researchers Prof. Michael Lindenbaum and Dr. Israel Wagner have done well to heed that advice. Their study of the behavior of ants has attracted international attention, and the trio's resulting "ant algorithms" may contribute to the development of more efficient robots and more sophisticated Internet search engines.

So just how does a team of scientists glean valuable information from tiny creatures that can only see a few inches ahead of themselves?

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Ant researchers
(left to right);
Prof. Lindenbaum,
Dr. Wagner and
Prof. Bruckstein

ANTIDOTE

"What's beautiful about ants is that they form an organism made of little units, which are actually quite simple and myopic. But together they do something very clever," says Bruckstein, who based his research on the studies of the late Nobel Laureate physicist, Richard Feynman. "Ants have the astounding ability to carry out extremely complex tasks like searching for and transporting food, using a sort of global intelligence that emerges from very simple rules of local interaction."

Ants accomplish that feat by laying down trails of pheromones, a chemical that indicates to other ants where their predecessors have been and where they were going. The next ant to come along is able to decipher the message encoded in the chemical. This collective interaction optimizes the route they take to forage for food, and also enables them to know when other ants are nearby and what to do when they bump into each other.

These are precisely the characteristics needed by a robot to carry out a task effectively – and by an Internet search tool to find data quickly and thoroughly, according to researcher Wagner, who devoted four years of his Technion doctoral studies to developing the concept. He is a research engineer with IBM Research Center in Haifa. Lindenbaum, a former student of Bruckstein, is a professor in the Faculty of Computer Science.

The research team studied a mathematical model of "ant algorithms" that

borrowed from the world of insects for application in robotics, distributed computation and communication networks. Instead of programming a single robot with a complex navigation system, the researchers propose building a swarm of identical, simple robots with the ability to seek out the best route and communicate their findings to one another.

Bruckstein, Wagner and Lindenbaum were able to prove mathematically that desired global behaviors may be produced by simple rules of collective interaction. "If you leave signs, you can improve the efficiency, and this applies to Internet searches," says Bruckstein. "We are

proposing a mode of search that sends 'robots' into the net and programs them to leave traces wherever they go."

The traces will be in the form of a file containing vital information, left by the search engine's advance messengers, which would indicate where information has already been gathered and where to search for more information. The system will take longer than conventional search methods but will probably produce exhaustive search results, Bruckstein adds.

"My father once told me that in medieval Romania, the beggars had a secret sign language," says the professor, who was born and raised in Sighet, Transylvania. "They used to scratch signs on the doors of dwellings so that the next beggar would know whether the owner was generous or not. That's what we're trying to do with the Internet."

