as being the cause of your difficulties rather than admitting you have problems coming up with the money."

The squabble started in the UN "fifth" or financial committee. Up to that point, negotiators in other UN committees had agreed that the new policy unit would be called the Center for Science and Technology for Development and that it would be headed by an Assistant Secretary General, who in turn would report to the Director General for Development and International Economic cooperation, Kenneth Dadzie. It was understood by the developed countries that the staff of the new center would come from the present UN Office of Science and Technology (OST), which has a staff of eight to ten. But in the fifth committee, which is rather late in the bureaucratic game, Third World representatives squeezed in seven positions in addition to the OST staff.

When the General Assembly voted on the part of the resolution concerning the new center, the United States and others objected. Australia, Canada, and Japan, all of whom had backed the proposed center in the second committee, abstained on the vote. Their common complaint was that they had been tricked by last-minute maneuvers and that the new positions were not needed. Said the Canadian ambassador: "We deplore the fact that, at a time when my government is trying to cut 40,000 jobs from our civil-service rolls, we are here creating positions without specific justification in fact." The developed countries also complained that the jobs were merely a payoff for people who had worked on the staff of Frank Joao da Costa, the Brazilian who was Secretary General of UNCSTD. "We deplore," said the Canadian ambassador to the General Assembly, "this perpetuation of the inane personalization of work which marred the conference from the start."

Answering these attacks was B. C. Mishra, one of India's ambassadors to the UN and chairman of the bloc of 120 or so emerging nations known as the Group of 77. He denied that personal interests were involved and said, in short, that the new appointments were needed.

An unstated but nonetheless real issue in the debate is that developing countries distrust the existing UN bureaucracy. New staff to them means new ideological input as well. But now that the OST staff will be joined by seven others of a different ideological stripe, some observers are worried. Said one State Department official: "There has been considerable friction between these people in the past,

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Fear of Spies Cuts Short Industry Tour

A funny thing happened on a recent AAAS-sponsored visit to "silicon" valley in California, where 100 or so companies a half-hour drive south of San Francisco are pressing home the revolution in microelectronics. One of the companies turned away a tour bus.

The incident is clearly not a big deal, but it does illustrate how a creative and very competitive industry can turn a bit paranoid.

It all began this past fall, when arrangements for a half-day tour of the Hewlett-Packard integrated circuit processing laboratory and a similar lab at Fairchild Camera were being made. The tour was to be held during the AAAS annual meeting in January. Fairchild requested that advance registrants note their citizenship. AAAS agreed, and put the request on the advance registration forms printed in *Science*. Fairchild later requested that no foreign nationals be allowed to tour their facility. AAAS said no, that the international scope of the meeting made that impossible. Arrangements were left up in the air, though on paper the two-company tour stayed as planned. After the tour bus actually pulled out from the San Francisco Hilton, however, it got only as far as Hewlett-Packard. The tour of Fairchild had been canceled. Fairchild now says that the bus was behind schedule and could not have been accommodated in time. People on the bus disagree, and say they think that Fairchild was afraid of spies.

Fear of industrial espionage is probably not unfounded. It has long been alleged that the Japanese have walked away with hard-won U.S. designs and then used them to produce their own silicon circuits. As the complexity of the chips has increased during the past decade, this has become a sensitive issue. Three or four years may now go into the design and debugging of a complex integrated circuit no larger than a match head that contains a hundred thousand transistors. Companies are understandably interested in protecting their investment.

Fairchild is especially sensitive to the loss of new ideas and designs. Integrated circuits were invented at Fairchild in the late 1950's, though the company was slow to capitalize on the potential of the devices and of the research team that developed them. A brain drain soon followed, many of the talented engineers and chemists leaving Fairchild to form their own companies, such as Intel Corporation.

If industrial spying becomes more profitable as circuits become smaller and more complex, company executives may have a lot of hand-wringing ahead of them. Several speakers at a AAAS symposium back at the Hilton forecast that existing technology will soon allow up to one million components to be etched onto a tiny chip of silicon. In another 10 years or so, according to Gordon E. Moore, chairman of Intel Corporation, the figure will be something like a billion.

At that point, he said, the physical limits of storing information in matter may be reached. "Once you get down to circuit elements a few tens of atoms across, you cannot do electronics." He noted that such circuits may eventually exceed the complexity, if not the flexibility, of brain tissue.

Watching for spies may sound exciting, but according to Moore most of the industry's day-to-day effort goes into avoiding defects. A small nick in a single transistor means an entire chip containing a hundred thousand good transistors must be discarded. Finding a defect can be a headache. If an integrated circuit were imagined to be the size of a football field, a defect would be the size of a quarter.

Even after painstaking redesign of a circuit to eliminate defects, results are often so-so. Only about 20 percent of the chips that come out of a well-established manufacturing process are perfect. With new circuits, about 1 percent work properly.

Despite problems, success has been overwhelming. Where will the revolution lead? Speakers at the symposium were anything but certain. One clear fact that did emerge was that demand for graduate students has outstripped supply. The starting salary in the industry for even an inexperienced Ph.D. is $30,000. Moore said optimistic estimates say the number of qualified graduate students will remain about level, while demand for their services will grow exponentially during the 1980's.

This dearth of technical talent has made for much job-hopping in the in-

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dustry, an employee being lured away every couple of years by a higher paying competitor. As people move, new ideas and designs go with them—to the chagrin of some industry executives and the delight of others. During the tour of Hewlett-Packard, one engineer who commented on this more-or-less legal form of industrial espionage noted that the situation probably bodes well for the future of the U.S. electronics industry. In Japan, where there tends to be a life-long identification with a single company, design ideas sometimes go stale. In the United States, on the other hand, job-hopping has pushed creative tension to new heights.

Paranormal Powers Are So Much Hocus-Pocus

"I feel a little silly, as a grown man, watching kids try to bend spoons while I'm not looking. But I've put up the money, and no one can say I'm not sticking to the bargain."

James Randi, a bearded magician and a founding member of the Committee for Scientific Investigation of Claims of the Paranormal, has been trying to give away $10,000 for the past 15 years. More than 300 people have tried to claim the prize by demonstrating their paranormal powers. All have failed.

"ESP experts and blindfolded psychics have proved better at sleight-of-hand and mouth than they have at genuine psi powers," he says. "Though they make wild and wonderful statements about their powers, examination proves that they are either self-deluded or out-and-out fakes."

Randi sought out three more candidates for the prize during the recent AAAS annual meeting. One was David Evans, whose father, physicist Lawrence Evans declared himself stunned when little David was able to bend spoons after taking a course offered by the Santa Clara County school system. Another was Wilfred Laine of the Veterans Administration Hospital, who has learned how to bend spoons and forks with his mind after studying with a local psychic. A third was a girl in East Richmond Heights who, according to her father, punches holes in plastic butter lids using her mind alone, and also can cause soy sauce to teleport through space.

"With all the claims of paranormal power that we see every day in the press," says Randi, "you'd think that I'd have many more people lined up to take the prize. As it stands, just 52 persons have passed the simple preliminaries, only to fail to support their claims to supernatural powers."

History of Science Losing Its Science

Once a highly respected field that focused on the conceptual evolution of scientific ideas, the history of science is losing its grip on science, leaning heavily on social history, and dabbling with shoddy scholarship.

That, at least, is the situation as seen by Charles C. Gillispie, a historian of science at Princeton University who spoke at the AAAS annual meeting. Gillispie warned the attending scientists to keep a close watch lest the field fall prey to those who would use history against science.

Take a recent round table at the Princeton University school of political science, for example. "Do scientists have blood on their hands?" was the title of a discussion on the history of atomic weapons that Gillispie attended on a whim. The predictable conclusion, he said, was that they do. "There was no one present, either on the panel or in the audience, who knew how the technical prospects for atomic weapons appeared to the physicists concerned at any of the junctures at which they sought to make known the possibilities. The atomic bomb was treated as a foregone conclusion from the moment Hahn and Strassner split the uranium atom—though none of the panelists had the least idea what in fact had happened, and only a vague idea of when it happened."

Less odious but still troublesome to Gillispie are social histories that ignore science altogether, such as studies that deal with the role of women in a particular scientific institution but omit their actual scientific work. "The effect," he says, "is a little like a social history of Philadelphia in 1776 which never mentions political theory and where the signers of the Declaration of Independence are men about town."

Another trend, he said, is that scholars focus on the personal and anecdotal: Newton on alchemy rather than on motion, Kekule's snake dance rather than the benzene ring, Darwin's neurosis rather than his marshaling of evidence. Some so-called scholars focus on scandal. Did Mendel really falsify his data? Did Hale really hate his wife? "These scholars," says Gillispie, "have a lust for just the sort of thing most rigidly ruled out of court in the science we do now—the irrational, the personal."

Gillispie's position, unusual for having been taken in public, is privately expressed by many old-school historians of science. When the field was first founded, many of these scholars were themselves scientists. After studying mathematics, a "hard" science such as astronomy or physics, and the modern languages in which science was transmitted, they learned Greek, Arabic, and Latin. They studied old texts. George Sarton, who helped found the field shortly before World War I, is said to have been perfecting his Mandarin in his late 60's.

During the past two decades, however, students of science history have tended to be political scientists who know little of science and its history and who focus on the social implications of science. "Feelings here are so strong," says Gillispie, "and the science so technical, that any thought of controlling judgement of the events by knowledge of the science is normally abandoned at the outset. The more sensational the title, the less the sensitivity to the reciprocity of the influences between physics and politics or war, and the grosser the depiction of scientists as hucksters of weapons and research."

Though Gillispie says there is doubtless much to be learned from this approach, the trend is sometimes taken to extremes. "Scientists should pay attention to what historians and other social scientists are making of their enterprise. They should exercise a measure of vigilance, at least over the references to technical matters that even the most externally minded commentators cannot altogether avoid."

William J. Broad