

Michigan Today

The University of Michigan

Vol. 18, No. 3, August 1986



*THE CAVES
OF AJANTA: India's
treasure of art and
history*

Preparing to meet the Buddha incarnate.

(See story on p. 8.)

Michigan Today

The University of Michigan

Vol. 18, No. 3, August 1986

THE MOTHER TONGUE

Speakers of the world's 3,000 to 4,000 languages refer to their own languages as their mother tongues.

Many are aware that their mother tongue has cousins because closely related languages are often spoken in nearby lands. English, for example, may be called a cousin of Dutch, German and Swedish.

And persons with an elementary knowledge of linguistics know that their mother tongue also had a mother: The prehistoric language we call Germanic is the mother, or proto-language, of English, Dutch, German and Swedish.

Germanic, along with such other proto-languages as Celtic, Balto-Slavic and Indo-Iranian, is a daughter of an even older proto-language — Indo-European. The Indo-European languages constitute today's most widely spoken linguistic family.

Until quite recently, though, even experts believed that we could not trace our linguistic family tree back any further than Indo-European. Researchers stopped at around 5000 B.C. with many presumably unrelated families, Indo-European being one of them.

But some linguists say this is a short-sighted view of our linguistic ancestry. They contend that through meticulous, systematic comparisons of the stablest roots of the world's known languages, the conventions of logico-mathematical deduction and postulation allow experimental reconstruction of languages even more ancient than Indo-European.

Linguists with this view form the Nostratic School. They hold that in the early '60s two Soviet scholars reconstructed a language — dubbed Nostratic from the Latin for 'our' (*noster*) — that was spoken around 12,000 B.C. They call Nostratic a proto-proto-language, the mother tongue not only of Indo-European but of perhaps six other macro-families of languages long thought to be distinct and unrelated.

Furthermore, they believe it is plausible, even probable, that the remote genetic relationships between Nostratic and the other proto-proto-language families can be established. Such an achievement would involve reconstruction of an even earlier language of which Nostratic was an offspring — a proto-proto-proto language spoken 25,000 years ago.

These and related discoveries in linguistics, says Prof. Vitalij V. Shevoroshkin, who describes the development of Nostratic theory and research in this article, may ultimately unearth a primordial language of mankind. Some linguists theorize that such a language was spoken in Africa 40,000 to 50,000 years ago, but evidence for this supposition remains skimpy.

In any event today's research into our linguistic past provides evidence that conforms with and buttresses biological, anthropological, historical and other emerging knowledge about the common ancestry of human beings.

"The fact that we are in a human family appears in the family of languages," Shevoroshkin says. "It is logical to assume that all languages are ultimately related, rather than that very many languages have nothing in common."

Since most Nostratic theory appears only in Russian, Shevoroshkin and a U-M colleague, Prof. Thomas L. Markey, have published this year an English translation of a collection of such works, *Typology, Relationship and Time* (Karoma Publishers, Ann Arbor).

Professor Shevoroshkin will survey many language families and linguistic theories in a new introductory undergraduate course this academic year, *Linguistics III: Languages of the World*. — John Woodford.



V. ILLIČ-SVITYČ, a brilliant Russian scholar (shown in sidecar during his student days at Moscow University) died in 1966 at 31 after pioneering in the reconstruction of Nostratic. Professor Shevoroshkin, who knew Illič-Svityč during their days at Moscow U., says Illič-Svityč proved the existence of a genetic relationship between the Nostratic languages: 'He demonstrated the explanatory power of Nostratic theory by showing that a large number of facts, previously inexplicable when one looked within a given language family like Indo-European, could be explained from the larger Nostratic perspective. He was decades ahead of his time.'

Nostratic *mi 'I, *mi-nV 'me' > Uralic *mi 'I, *minV- 'me' (very similar in Altaic languages); Kartvelian *mi, *me 'I, *men- 'me' Indo-European *me 'I, *mene 'me'. Nostratic *ne (locative particle) > Uralic *-na, *nä (locative affix); Altaic *-na (locative affix); Dravidian *-nv (locative affix); Kartvelian *-n (locative affix). Afro-Asiatic *-n (locative affix).
Nostratic *lipa (unclear, what palatal l, or voiceless l); Indo-European *leip-, *lip- (unclear). Nostratic *laKa 'leg' (lerved in Uralic) > Uralic *lak, *lk- 'leg, foot'; Indo-European *lek- 'leg' (as in English 'leg'). Nostratic *lejna 'soft, weak' > Uralic *lejna 'weak'; Afro-Asiatic *ljn 'soft, weak'; Indo-European *lei-n- 'soft, weak' (Islandic *lin-r* etc.) Nostratic *luKV 'pierce, insert' > Uralic *lukk[ä]- 'pierce, insert'; Altaic *lükä- 'pierce'; Dravidian *tukk- 'insert, push' (Dravidian t originates regularly from *1); not found in West Nostratic languages. Nostratic *LäjHV 'water; pour/flow' > Uralic *LäjV 'a liquid; river'; Afro-Asiatic *lj 'water'; Indo-European *leiH- 'pour/flow', Nostratic *LubV 'be thirsty' > Afro-Asiatic *lwb 'be thirsty'; Indo-European *leubh- 'passionately desire something' (bh from Nostratic b regularly in Indo-European; note the meaning: secondary development). Nostratic *Laga 'lie' > Kartvelian *lag- 'put'; Indo-European *leg- 'lie, lay down' (gh from Nostratic g; compare bh from b in previous set). Nostratic *majrV 'young

By Vitalij Shevoroshkin

Exactly 200 years ago in a speech in Calcutta, the British philologist William Jones suggested that Latin, Greek and Sanskrit must have "sprung from some common source," one that was also the origin of German, Celtic, Persian and other languages.

At the time, many scholars believed linguistic species were distinct and unrelated, just as they presumed members of the animal kingdom to be. Others felt that even if such a long-dead proto-language had existed, it would be impossible to reconstruct it. The proto-language would, after all, have been spoken thousands of years before our earliest records of writing, and its death would predate by several millennia the passing of Latin and other "dead" languages among its offspring.

Only a half century later, however, the German scholar Franz Bopp reconstructed the proto-language Jones had hypothesized. That language is called Indo-European.

Bopp also described the genetic similarities among the languages in the Indo-European family. This linguistic family comprises the Germanic languages (German, English, Danish, Swedish, Norwegian); Russian, Czech, Polish and other Slavic languages; French, Spanish, Italian, Portuguese and other Romance languages, including Latin; and Greek, Celtic, Indo-Iranian, Albanian, Armenian and several other living and dead languages of Europe and Asia.

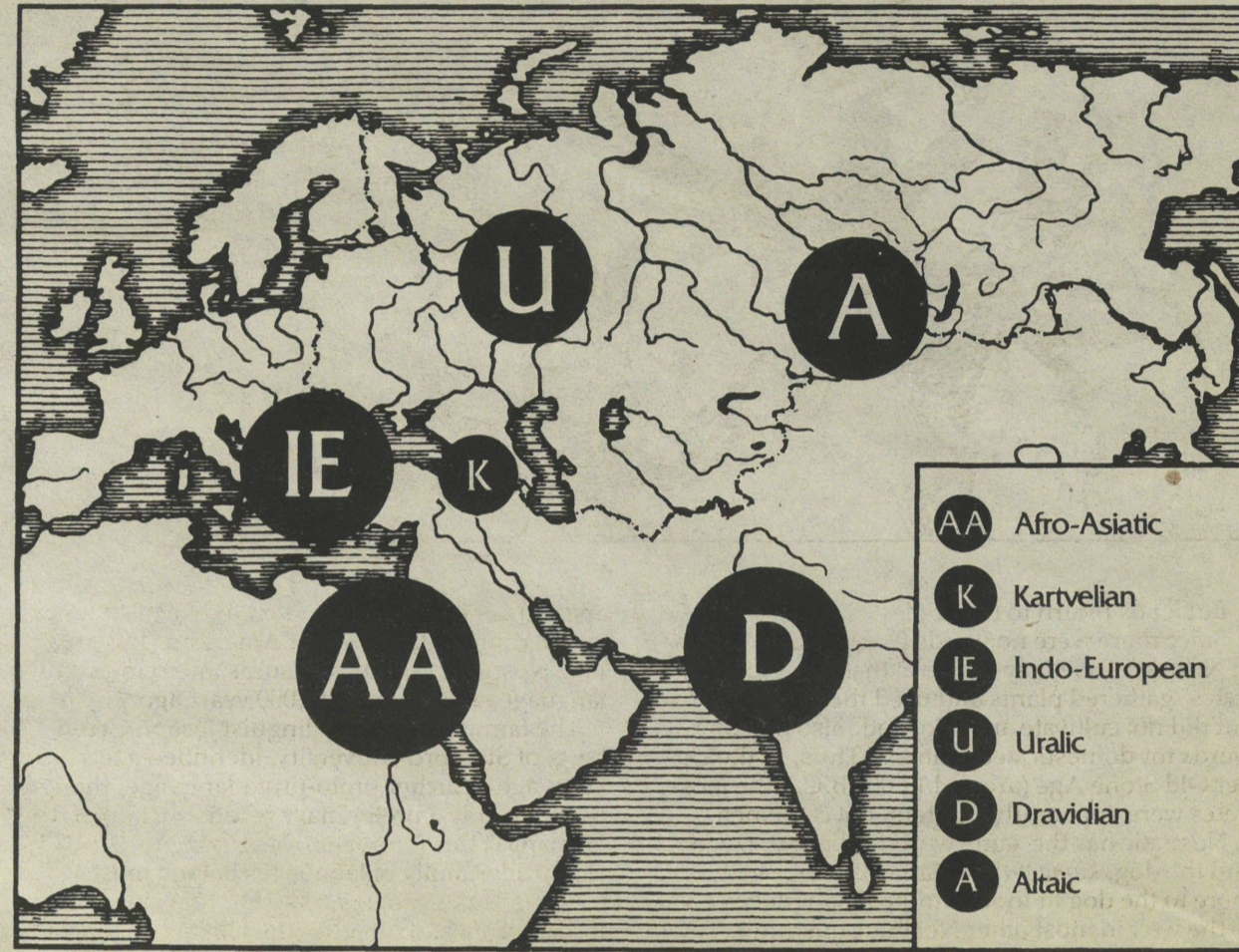
Since Bopp, linguists have reconstructed other proto-language families and their members. These include the *Afro-Asiatic* or *Hamito-Semitic* family (Arabic, Ethiopian, Berber, Cushitic, Chadian, Hebrew and other tongues spoken for the most part in North Africa and the Near East), the *Kartvelian* (to which belong Georgian and related languages of the Caucasus region in Soviet Georgia), the *Uralic* (including such Finno-Ugric languages as Hungarian, Finnish and Estonian), the *Altaic* (a family to which the Mongolian, Tungusian and Turkic proto-languages belong, and whose offspring include present-day Mongolian, Uzbek, Turkish, Kazakh, Kirghiz, Tatar, Korean and Japanese), and the *Dravidian* family of Malayalam, Tamil, Telugu and other tongues of southern India and northern Sri Lanka.

At a 1963 conference, the late Björn Collinder, the renowned Swedish linguist, said he hoped someone would soon prove his long-held thesis that Indo-European and the other proto-languages were related.

Collinder's revolutionary suggestion did not have to wait so long for confirmation as had Sir William Jones's before him. Even as he spoke, two linguistic researchers in Moscow were proving independently of each other that Indo-European and the five other proto-languages (and therefore the linguistic families that each engendered) are genetically related.

THE MOTHER TONGUE

The Nostratic Languages



These brilliant scholars were V. M. Illič-Svityč, who died in 1966 at the age of 31, and Aaron B. Dolgopolsky, who moved to Israel in 1976. The results of their experiments in linguistic history raised the question: What was the mother tongue of these macro-families of languages? Both Illič-Svityč and Dolgopolsky reconstructed this language — which can be called a proto-proto-language — and named it Nostratic.

This term, from the Latin *noster* ("our"), was proposed at the beginning of our century by the genius Danish linguist Holger Pedersen, who guessed at a broader genetic relationship between the major Eurasian linguistic families but did not attempt to prove it.

The few linguistic researchers then at work on the question of the broader relationships of languages (such as Collinder, who proposed several comparisons between Indo-European and Uralic, the German Karl Menges and the Russian Nikolai

Poppe) greeted the Soviet linguists' discoveries with enthusiasm.

Many other scholars, however — the farther west from Moscow the more insistently — dismiss Nostratic theory and research into genetic similarities of the language families as exercises in fantasy or futility.

Nonetheless, several experts, including Collinder and the prominent Russian linguist Vyacheslav Ivanov, have called Illič-Svityč's dictionary of Nostratic (published posthumously in several still uncompleted volumes) one of the highest achievements in the humanities in the 20th century. Yet to this day, this scholarly breakthrough is known only to a narrow circle of specialists.

Supporters of the theory believe that about 14,000 years ago humans in the Near East spoke this mother tongue. As time passed it evolved into different dialects, western (Indo-European, Afro-Asiatic and Kartvelian) and eastern (Uralic, Altaic and Dravidian).

These ancient proto-languages — the daughters of Nostratic — developed through the millennia as their speakers migrated into the independent languages spoken over much of the world today.

It would appear, on the basis of the data of borrowed words and of words denoting the meanings that are most resistant to change, that the Indo-Europeans did not migrate far. [See accompanying article, "The Stablest Words of All Time" — Ed.]

The Indo-European proto-language probably arose in the Near East, in the same area as Nostratic — perhaps in Mesopotamia or in eastern Asia Minor, where the Iranians and Turks live today — and later spread northward toward the Balkans while giving birth to numerous daughter languages.

The Indo-European language split into two dialects, Anatolian and West Indo-European. Speakers of the Anatolian languages remained in Anatolia (the Asian part of modern Turkey), where their descendants spoke the now-dead tongues of Hittite, Luwian, Palaic, Lycian, Lydian and Carian. [See accompanying article on Professor Shevoroshkin's research on Carian writing and our alphabet — Ed.] The West Indo-European speakers migrated further to the northwest. From this branch arose all the other Indo-European languages cited at the beginning of this article.

A Budding Scholar's Road to Glory

"ALMOST NOBODY is working on comparing the macro-families of the world's languages," Professor Shevoroshkin laments.

Without such work, the task of attempting to reconstruct the languages of 25,000 years ago, let alone the "grandmother" language of all — the primordial language of mankind of about 40,000 years ago (an assumption that, so far, has scanty data, pro or con) — cannot be undertaken.

"Just one student could begin that work now and make colossal progress if he or she was devoted to it full-time," says Shevoroshkin, who outlines the following program that this eagerly awaited budding scholar would follow:

— Make a computerized dictionary and unify transcriptions of the sounds of several hundred key words in the languages to be compared ("Preferably, these would be words from reconstructed proto-languages," Shevoroshkin says.)

— List some of the words with stablest meanings, such as words for 'water,' and list them and their subgroups (other water words would include sea, river, crook, rivulet, brook, stream and so on).

— Compare these words in pairs of language A

and B and in all other pairings in the possible combinations.

— Isolate similarities.

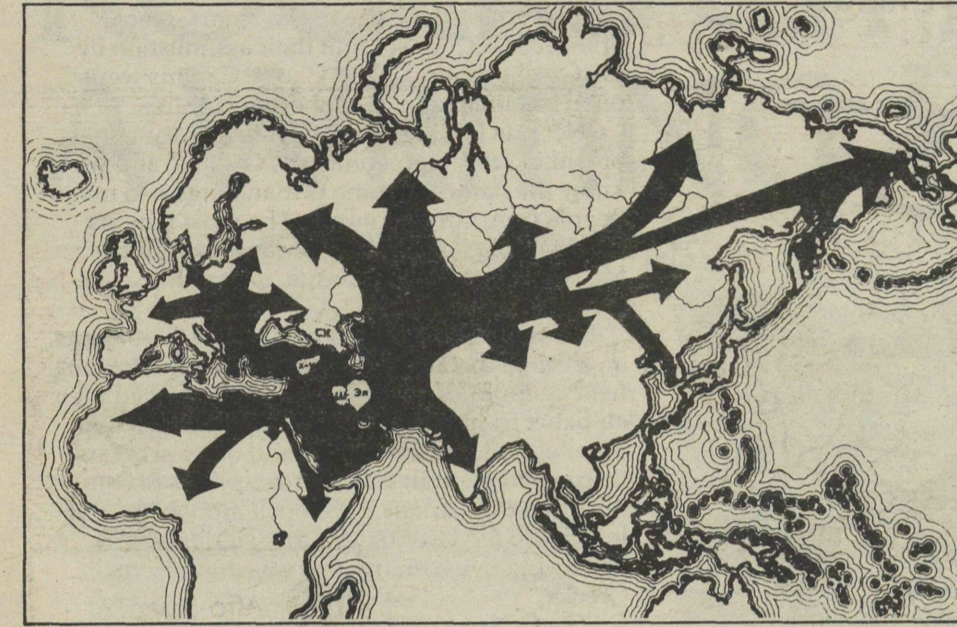
— Establish laws of relationships. (Do the words for water begin with or contain the same sounds or different sounds that have a known or demonstrable phonetic relationship with one another? This could be ascertained by comparing groupings of water words like mara, mala, dara, dala, which exhibit regular and known evolutionary transformations of initial consonants, as in the evolution of 'n' to 'd', or of middle consonants, the shift from 'r' to 'l' for example.)

— If no relationship between pairs or groups of these words can be established, move on to the next words in languages A and B.

— Perform the same word/meaning comparisons between languages of all the macro-families.

— When laws of relationship have been established among the macro-families, experimentally reconstruct the mother tongue of these families (and try to remain calm and philosophical when Nobel Prizes are handed out).

TONGUE



Spread of the Nostratic Languages From Their Near Eastern Homeland

(Source: A. Dolgopolsky)

But let us return to Nostratic. Since there were no words for cultivated plants in Nostratic, one may suppose that the "Nostrates" gathered plants and used them for food but did not cultivate any. Nostratic also had no words for domesticated animals. Thus, in the Upper Old Stone Age (around 15,000 B.C.), the Nostrates were apparently hunters, not cattlemen.

Nostratic has the same word for both the wolf and the dog, *kujna*, which came to be applied more to the dog in Indo-European languages and to the wolf in most other Nostratic languages. In Indo-European, *kuōn* was 'dog,' and the genitive form was *kun-es*; in Uralic *kūjna* 'wolf'; Afro-Asiatic *kjn* 'wolf, dog'; Latin *canis* 'dog'; French *chienne*, German *hund* and English *hound*; in Celtic the archaic meaning for 'wolf' can be traced in *ceū* and genitive *con*, a 'destroyer of cattle' or 'monster'.

This linguistic information indicates that the speakers of Nostratic were beginning to domesticate wolves, gradually transforming these wild animals into dogs, making friends of foes.

A few more Nostratic roots may illustrate certain phonetic laws of these languages, the general patterns for shifts in the typical sounds that make up words: If in the eastern Nostratic languages a 'u' follows a 'k,' then western languages obtain the consonant blend 'kw' or a similar compound with a consonant and 'w'. Again, in the Indo-European, the Nostratic 'k' as in 'cut' becomes a hard 'g' or voiced sound, as in 'gut'.

The Nostratic *kuni* ('wife' or 'woman') becomes in the Afro-Asiatic languages *KwVn* ('one of the wives', 'woman'). (The capital 'K' here and in other examples symbolizes a glottal sound — one made in the back of the oral cavity, at the vocal chords, and the 'V' symbolizes a vowel whose sound is undetermined, so the word is pronounced something like 'kwen'.) In the Indo-European, *kuni* becomes *gwen* ('wife', 'woman'), with the vowel 'e' expected here — a word that carried over into Middle English and whose root is still present in the English *queen*.

The vowels in Altaic, the mother of Mongolian, more closely reflect the older forms than do those in the western group, as in *kūmi* 'one of the wives'.

Students and followers of Illič-Svityč and Dolgopolsky are at work both on the further reconstruction of Nostratic and on the reconstruction of another proto-proto-language called Sino-Caucasian or Dene-Caucasian. This macro-family comprises the North Caucasian (Abkhazian, Chechen, Kabardian and many languages in Daghestan); Sino-Tibetan (Mandarin, Cantonese and other Chinese tongues, also Burmese and Tibetan); Yeniseyan (spoken in eastern Siberia) and Na-Dene languages (including the Apache, Navajo, Chippewayan and other Athapascan languages of Western North America, and Tlingit, spoken by the seafaring "American Indians" of southern Alaska and British Columbia).

According to their research, there was in Asia a foundation language that broke up into the North Caucasian, Yeniseyan, Sino-Tibetan (which includes Chinese) and Na-Dene languages. The

speakers of Na-Dene migrated to North America and became the Northwest American "Indians." Like Nostratic, the Dene-Caucasian proto-proto-language existed about 14,000 years ago.

The famous American linguist Joseph Greenberg, of Stanford University, identified a few years ago a further proto-proto-language, though he made only a preliminary reconstruction of it. He named this foundation language Amerind. To this macro-family of languages belong most tongues of the Americas: the Penutian languages in California and Oregon; the Hokan languages in the American Southwest; the Uto-Aztecan languages of New Mexico and Mexico; and many Central and South American languages as well. Greenberg's book on this subject, *Language in the Americas*, will appear this fall.

Long before any speakers of Indo-European languages came to this hemisphere, then, the Amerind macro-family existed in the Americas — the languages in the north of the hemisphere belonging to the Dene-Caucasian macro-family that also includes languages in northeastern Asia and that segment of the Nostratic grouping that includes Eskimo-Aleutian.

But are these three large macro-families, the Nostratic, Dene-Caucasian and Amerind, genetically related to one another?

Ivanov and other comparativists believe not only that these three linguistic proto-proto-language families are related, but that the others are as well, through what may be called a proto-

proto-proto language spoken 25,000 years ago. To reconstruct such a language would require comparison of many of the stablest words whose roots bear similarities in the Amerind, Dene-Caucasian and Nostratic linguistic families, and in other languages of the Earth.

There are many tentative comparisons between the proto-proto-families. The words for 'fog' in the forerunner of the Athapascan Native American language is *KVm* (glottalized 'k', an undetermined vowel then 'm') and in North Caucasian it is *KKwomV*. The words for 'foot' in these two languages are *Tah* and *TuehuV*, respectively. Amerind has *kuna* for 'woman', which is close to the Nostratic *kuni*. And the Nostratic *mVno* and *mona* for 'man', 'husband' or 'master' is almost identical to the Amerind *mano* 'husband'.

A chief task for linguists now is to identify other large linguistic families, to reconstruct their remote ancestors and then to begin a systematic comparison of all stable roots. For example, Indo-European *egho* becomes German *ich*, English *I* and Old Russian *az*.

Computers will provide tremendous assistance to any researcher attempting to build the still-unreconstructed other sister proto-proto languages of Nostratic. In addition to Dene-Caucasian and Amerind, these include:

— the macro-Asiatic language that gave rise to Polynesian, Thai, Micronesian, Tagalog, Khmer, Vietnamese and numerous other languages, — the mother languages of the New Guinea and Australian tongues

— and what seems to be the oldest of all linguistic families, the Khoisan, which often employs clicks made in the back of the throat (Hatsa, Sandawe, "Bushman" and "Hottentot" languages of southern and eastern Africa).

Much also remains to be done on African languages that seem to belong to the Nostratic family, including the Niger-Kordofanian family of south and central Africa (Swahili, Zulu, Congo and other Bantu languages, and also Fulani, Ashanti, Mande and Kwa); and the Nilo-Saharan family (Saharan, Dinka, Efe, the Songhai language of Mali and languages spoken in parts of Ethiopia, Sudan, Chad, Zaire, Uganda, Cameroon and Tanzania).

The thesis that all languages are related through a single language spoken in the farthest prehistoric past is persuasive and by now supported by linguistic research. It effectively refutes the long-held notion that many of the world's linguistic families stand in no genetic relationship to each other, a view like the pre-Darwinian assumption that humans, animals and other creatures were distinct and unrelated.

We must stop speaking about the "unrelatedness" of languages and start to describe the degree of relatedness. Recovering ancestral languages spoken in the remote past will give us the key to many central issues about the origin, development and diffusion of peoples, cultures and humankind itself.

The Stablest Words of All Time

THE FIRST and most important step in comparing language families in search of a genetic relationship is to find out what to compare and upon what bases the comparisons should be made.

In reconstructing Nostratic, Aaron B. Dolgopolsky, a Moscow linguist who later emigrated to Israel, surveyed 140 languages of Europe and Asia.

"Using statistical methods, Dolgopolsky identified and inventoried the 15 stablest meanings in these languages," says U-M Professor Shevoroshkin, who was a colleague of Dolgopolsky's before they both left the Soviet Union. "These were the words that could then be studied for evidence of common ancestry once similarities based on pure coincidence and borrowings had been ruled out."

To insure that he would avoid comparisons resting on superficial similarities, Dolgopolsky eliminated all pairings that could reflect onomatopoeia (as in 'buzz' for a bee's sound), interjections ('oh! aha! yikes!') or baby talk ('coochie-coo').

Dolgopolsky came up with two groups of words representing meanings that are seldom or never replaced by other words with the same

meaning in any given language. The words were mostly nouns, including many body parts; there were few adjectives and no verbs.

The stablest 15 meanings were words for the following objects or concepts:

1. I/me
2. two/pair
3. thou/thee/you
4. who/what
5. tongue
6. name
7. eye
8. heart
9. tooth
10. no/not (both negative proper and prohibitive)
11. fingernail/toenail
12. louse
13. tear (as in weeping)
14. water
15. dead.

These meanings were represented by words that ranged from those that never changed in the 31 Indo-European languages studied to those that changed in no more than a fourth of the languages.

A second group of 10 words changed only slightly more frequently. They were:

16. nit (larva or egg — related to louse)
 17. moon
 18. hand
 19. night
 20. blood
 21. horn
 22. full
 23. sun
 24. ear
 25. salt.
- Dolgopolsky's article on the stablest meanings, "A Probabilistic Hypothesis Concerning the Oldest Relationships Among the Language Families in Northern Eurasia" is translated in Typology, Relationship and Time by Shevoroshkin and Markey, Karoma Publishers (1986) Ann Arbor.

REFLECTIONS

OF A HITTITOLOGIST

Vitalij Shevoroshkin discusses the Russian mind, Stalin the linguist, ancient Carian writing and an Egyptian tomb

By John Woodford

Prof. Vitalij Shevoroshkin hopes recent Russian achievements in comparative historical linguistics will inspire American linguists just as the Soviet Sputnik helped launch U.S. space science 30 years ago.

"Until recently, only very few American linguists showed interest in research establishing remote relationships among languages or in experimentally reconstructing Nostratic [see preceding article] or other languages that predate Indo-European," says Shevoroshkin, who immigrated here from the Soviet Union a dozen years ago after "getting a little too much into politics."

Since most American linguists consider such investigations to be fruitless, "funding has been scarce in this area in the States," Shevoroshkin adds. Of the 30 or so of the world's scholars engaged in this work, he estimates that at least half live in the Soviet Union, eight in the United States and most of the rest in Eastern Europe.

Shevoroshkin suspects that some Western, especially American, resistance to the theory of and research into a common genetic foundation for all languages arises from the "rigidity of established patterns that ban any pioneering ideas, as well as from the collapse in the U.S.A. of 'long-range comparisons' of the '60s, which were performed without any strict methodology."

When Shevoroshkin taught at Yale before coming to U-M, his department "told me not to discuss Nostratic theory in my classes," he recalls with bemused disbelief.

Shevoroshkin says his U-M colleague Prof. Thomas Markey of the Department of Germanic Languages and Literature thinks some nay-saying scholars mistakenly believe that the Nostratic hypothesis springs from ideological rather than scientific motives.

"This research is square in the Russian scientific tradition," says the lean and bearded scholar, whose whole being seems to respond to the energy of ideas in flux. "The Soviet Union has many outstanding theorists in linguistics, just as in chess and mathematics, because these are fields relatively free from political pressure."

"In the Soviet Union, you can spend a lot of time just sitting and thinking about what interests you, keeping it to yourself as you like. It is a culture where energetic and imaginative people cannot channel these drives into entrepreneurial activity. This was true also in older times under the czars. That may, in part, explain why the Russian theoretical mind is very strong."

His homeland's openness to controversial linguistic theories is also a consequence of the fact that its more than 130 ethnic groups speak approximately that many languages.

"The U.S.S.R. is a great language lab," Shevoroshkin continues. "But there has always been a deep interest in languages and history in that region. Even Lenin and Stalin wrote about linguistics — Lenin did so with some merit. Stalin's writings were done by somebody else."

Shevoroshkin's specialty is the Hittite languages of an empire that flourished from 1600 to 1200 B.C. in Asia Minor. More particularly, his

field is the Hittite-Luwian, or Anatolian, family of Indo-European languages, and most particularly his subject is Carian.

The Carians were seafaring merchants and mercenaries who lived 2,500 years ago on the southwestern coast of present-day Turkey, straight across the Aegean Sea from Greece. From 1200 B.C. or so until their assimilation by the Greeks around 300 B.C., the Carians were often dominated by neighboring cultures.

"Not much is known of Caria's history," Shevoroshkin says. "Its capital was Caunos, and we know the names of some Carian kings and many people from Greek sources. The most famous was Mausolos, whose tomb was the original Mausoleum at Helicarnassus, one of the Seven Wonders of the World."

The Greeks considered the Carians barbarians, an attitude that may have contributed to the long-held assumption that the Carians borrowed their alphabet from the Greeks. Only in the last two decades have Shevoroshkin and other scholars discovered enough Carian inscriptions to contend that the Carians developed alphabetic writing before the Greeks, that any significant borrowing between the two was done by the Greeks.

"The Carian inscriptions indicate that the Carian alphabet was closely related to older alphabets used by the Southern Semites around what is now Southern Yemen and the Sinai region," Shevoroshkin says.

Carians often wrote their names, and even some frequent verbs, using only consonants and omitting vowels. That is a significant feature of Semitic writing. For example, the name *MES-NARB* could be written *MSNRB*. Vowels, too, were often dropped from frequent words, like verbs meaning 'wrote,' 'incised,' and 'spoke.'

"The Carian writing seems to be quasi-alphabetic, because the vowels are not always written," Shevoroshkin says. "When you study Carian texts, you feel the origin of the vowels taking place, you feel you are witnessing the separating of vowels from the consonants in their writing."

The Carian writing system has convinced Shevoroshkin that Anatolians were closer to the origin of the alphabet than were the Greeks, that the alphabet emerging in Carian must have influenced Greek writing.

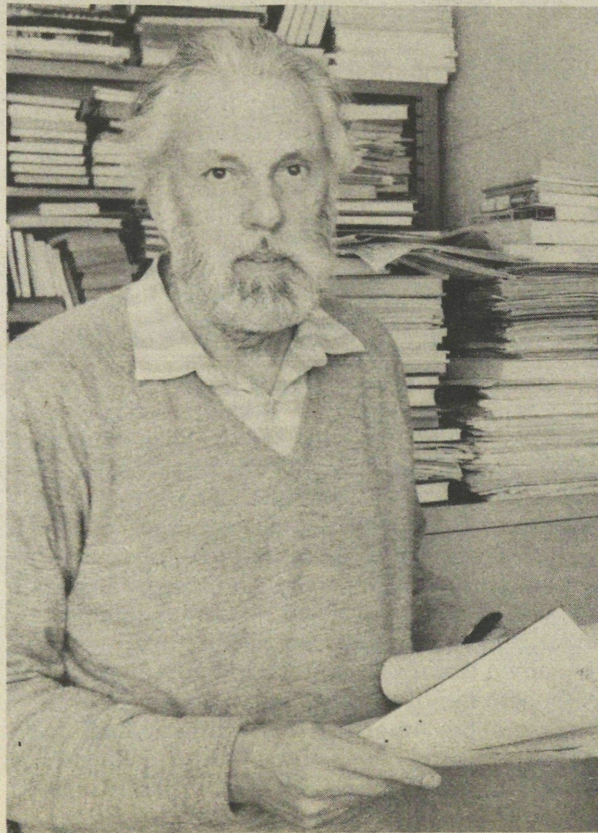
Shevoroshkin has discovered about a fifth of the 250 known inscriptions in Carian, mostly on tombs, temples, vases and other artifacts of the Carians in Egypt. Since there have been no digs in the former Carian region of Turkey yet (the first began this summer), most known Carian inscriptions are on Greek and Egyptian artifacts.

Aided by U-M Rackham and National Science Foundation grants, Shevoroshkin has found 50 new Carian inscriptions in Egypt since 1983. His most recent find was really made by his wife, Galina, last December near Luxor. They were in the Tomb of Montuemhat at the site of the Valley of the Dead of ancient Thebes — an appropriate setting for serendipity, as Shevoroshkin vividly recalls:

"After two hours, we had finished checking on 20 previously recorded inscriptions. As we left, we walked past a passage that had recently been cleaned out. Suddenly, my wife stopped, turned back and said, 'Look, there are some Carian inscriptions on that gate.'

"Galina is a linguist, too, a specialist in Russian phonetics. And since she's drawn and photographed Carian inscriptions and provided other technical help for me, she could recognize Carian."

"Galina found some more inscriptions that day on the walls of a staircase leading to the tomb and on a column in a hall. The passage had been opened only a year ago. We asked the American Egyptologists from the Chicago House in Luxor if anyone else had seen or paid attention to these inscriptions, and they said no. We were just lucky."



'ALMOST NO ONE is working in the Carian language — just a Hittitologist here and there, like me,' says Prof. Vitalij Shevoroshkin, who will teach an introductory linguistics course this fall.



'IT WAS actually my wife, Galina, who found the Carian inscriptions that we reached by sailing on feluccas up the Nile,' Shevoroshkin reports.

| Egyptian hieroglyph | Sinai script | Old Sem. (north) | Name of letter (Hebrew) |
|---------------------|--------------|------------------|-------------------------|
| 𐀀 | 𐤀 𐤁 | 𐤀 | āleph (ox) |

THE PICTOGRAPH of the ox originally meant just that, 'ox'. But over centuries, the symbol turned on its axis and evolved into a letter, becoming the Hebrew aleph (ox), the Greek's first letter, alpha, and then our 'A'.

CARIAN writing (several examples of which are shown here) resembles both the Greek and the older Semitic systems, indicating that further disclosure of the origin of our alphabet is likely to depend upon deeper understanding of South Semitic languages. 'Increased explorations in places like Yemen could be fruitful,' Shevoroshkin says.



Forget the trombones —

ROGERS CITY'S GOT A WRITING BAND

— there's more music in tropes and trochees!



What Rogers City needed was a boy's band, and as audiences of *The Music Man* know, the Iowa town got just that. But what Rogers City needed, a local musician concluded, was a writing institute for high school boys and girls. And now this Michigan town has one, the Huron Shores Summer Writing Institute.

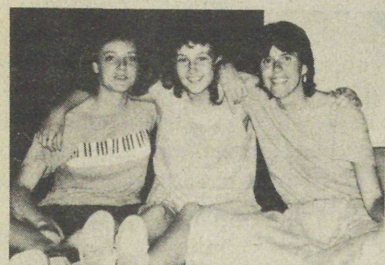
The writing program, which may well become a model for others in the state and nation, began this summer in Rogers City, an economically depressed town of 4,000 that sits on the shores of Lake Huron atop the state's Lower Peninsula — right on the index finger of the hand that symbolizes the peninsula's shape. Here is how it all happened . . .

By Marsha Dutton

The trickle-down effects of unemployment in the Rogers City, Michigan, area have injured local schools. So much so that the 415-student high school lost its accreditation after curriculum cutbacks.

Despite their economic problems, however, the people of Rogers City jealously guard the quality of their school system; even now they devote themselves to figuring out ways to enrich their children's education rather than merely holding the line.

So when Al Slote, an author and former U-M professor of communication, visited Rogers City and told local piano teacher Marilou Ikens that her town was a perfect site for a music camp, she slept on the idea. In the middle of the night, Ikens awoke with the insight that Rogers City didn't need 76 trombones from Wells Fargo to turn itself around. The region's teenagers had plenty of music programs available. Hadn't her college freshman son told her just a few days earlier that college-bound students needed to learn to write better? So Ikens decided to launch a writing-enrichment program.



Students Yvonne Brooks and Joanna Haselhuhn and U-M's Cathy Fleischer (l-r).



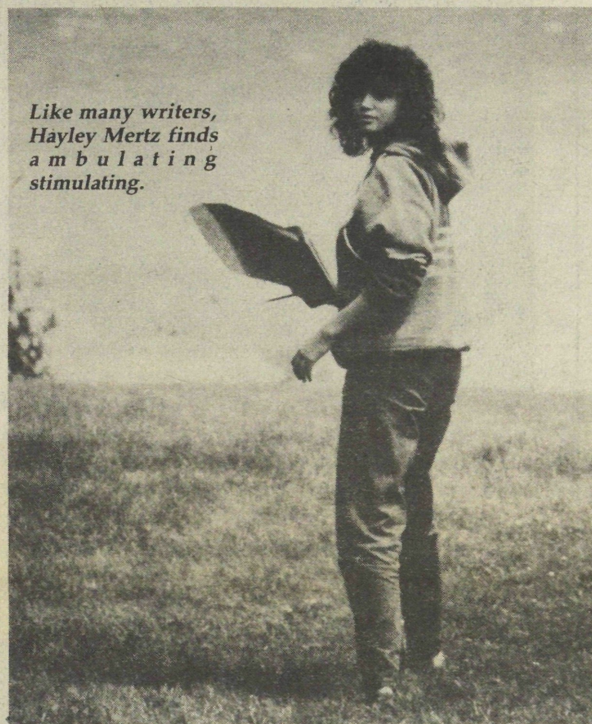
Brian MacFalda collects his thoughts

After learning of Ikens's idea, the townspeople banded together to make it happen. High school students were involved in planning the program, too. Some made the 10-hour roundtrip to Ann Arbor several times to consult with faculty of the U-M Introductory Composition Program, which Ikens had contacted early on for assistance.

William Ingram, professor of English and director of introductory composition, had greeted Ikens's idea with enthusiasm, telling her the University would supply some teachers and help put together a grant proposal. Soon the institute had support from the Michigan Council of the Humanities and a state fund for sesquicentennial programs.

Then it was time to shape the writing program. The way to improve your writing is to write, writers say, then to read what you've written and go write again. It's hard work.

That's what the 32 writing students, who were already pretty good writers by current national standards, found out as they chronicled local life and history. By the end of two weeks they had produced a 140-page book from the facts and impressions they had gathered by observing their town and its people, interviewing residents and examining local newspapers, pamphlets and memorabilia.



Like many writers, Hayley Mertz finds a m b u l a t i n g stimulating.

The instructors in the program, three doctoral candidates in English and Education at the U-M and one high school teacher from Rogers City, wanted students to discover that writing is first of all a process. As Professor Ingram explains, "You end up with a product, but you don't start out with one. In fact, you can't even be sure what you want to say until you've written it."

The process was presented as a series of steps — prewriting, writing and revising. Instructors suggested questions writers could ask themselves at each step: "Do I have someone in mind who will read this?" "How can I rewrite this sentence so that I *show* rather than *tell*?" "Can I combine or separate any sentences to change the emphasis?"

Students began with their own impressions — describing the lighthouse in the bay, composing character sketches of the townspeople and keeping daily journals.

At the same time, they received guidance from their coaches, Dan Cox of Rogers City High School and John Lofty, Cathy Fleischer and Dave Schaafsma of the U-M. Ikens reports that on final evaluations students ranked individual conferences with staff members as one of the most valuable aspects of the program.

Students also met regularly in groups of eight with an instructor, to read their own writing, discuss problems they'd encountered, exchange solutions and read the works of published authors. On other occasions students responded to one another's writing — praising and recommending change — in sessions called "peer critiquing."



Michelle Smolinski

Student Michelle Smolinski's contribution to the book indicates that the workshop succeeded in that goal as well. Smolinski, who signed up for the institute because "I thought it would help me get ready for college," combines a personal narrative — her family's experience of her father's five years of unemployment — and interviews

with managers of the company that laid him off, U.S. Steel's Calcite Division. In the course of her article excerpted here, she gains understanding, offers it to the reader and raises new questions, so demonstrating the way in which the process of writing becomes the product:

I was watching the snowflakes cascade to the ground. My father drove into the drive faster than usual; the door slammed as he strode to the kitchen, threw his thermos down and swore under his breath. He turned to me and opened his mouth as though to speak, but he went upstairs to my mother.

I curled up on the rocking chair and listened to their muffled voices above me. Soon they came out, Mom's face taut with worry, and Dad looking almost ashamed. I walked toward them, wanting to know what was going on, then glanced at Michael, my brother, who had just walked in, anxiously waiting to find out what was wrong.

"Your dad's been laid off."

I didn't know what to say.

"Money is going to be very tight around here."

. . . A few days later Dad received a letter from the United States Steel Corporation stating he was indefinitely laid off. He said nothing for days following that.

Let me take a moment to explain about where my father was working. Calcite is the largest limestone operation in the world. The company ships out of Rogers City to places such as Gary, Indiana. Limestone has various uses, such as purifying steel, and it is used in cement-making. My father had worked on shovel repair; the shovels are used to dig the limestone out of the quarry. He drove trucks, loaders, and dozers, which are used for loading. He worked in the mill as a conveyor attendant to pick out the different sizes of stone and also was an electrician's helper.

During the five years he was laid off, Dad had asked a lot of questions and wanted answers. Now I want some answers. Why did they lay Dad off? Who is responsible?

[One of the persons Smolinski questioned was a company public relations man. Their dialog follows:]

"Did many people lose their jobs?"

"Not too many."

"There are people with ten to twenty years of service in Calcite; they have a home and children ready for college, and now they're laid off, what interest does the company have in these people? Are they looking for other jobs for them?"

"You use the people that you need to use. We're in business the same as anybody else. You can't afford to employ more people than you need. There's no plans to help them secure jobs elsewhere. The burden of finding a job falls on that person."

. . . One of his closing statements really stuck in my mind and made a lot of sense.

"The future of Rogers City depends on the people; what they want to do, and their efforts to bring other industry in to maintain or improve the employment level. I don't think we should be so dependent on Calcite."

. . . Many from my generation feel we have no future in Rogers City, so we will have to look elsewhere for jobs. All that will remain is the older generation. What will be left when they are gone? If no other industry is brought in, what will be left of Rogers City?

Professor Ingram points out the significance of what the students learned: "Competence in the English language is a paramount skill, often the key to success; writing ability is the most easily measurable index of that skill."

Further, he suggests, the program may have benefited the U-M writing staff and future thousands of undergraduates by affording U-M teachers of composition "an opportunity to address many basic writing issues at the high school level, thus strengthening both the theoretical and the practical interconnections between high school and college writing. The activities of the workshop constitute a legitimate controlled experiment in composition pedagogy."

There is new music in Rogers City these days. The townspeople who contributed money, hosted out-of-town participants, opened their memories to young people and cheerfully cooperated in turning their quiet town into a working laboratory are now singing the program's praises and looking forward to its successors.

But the most welcome music is that of 32 high school students who have discovered the enduring melody of their own words.

For information about obtaining the Rogers City students' book, contact the U-M Introductory Composition Program, 444 Mason Hall, Ann Arbor MI 48109. Phone: (313) 764-0419.

This article is adapted from a speech in May by Linda S. Wilson, the U-M's vice president for research. Vice President Wilson presented the address in Philadelphia at the American Association for the Advancement of Science's symposium, "Increased Spending for Defense R&D: Its Effects on University-Based Research."

By Linda S. Wilson
Vice President for Research

The Strategic Defense Initiative (SDI) is a large and highly visible government program. It is ambitious in its goals, even heroic in the technical challenges it poses. It addresses a problem area in which the stakes are very high, both in terms of the potential consequences and in terms of the investment required. It emerged on the research and development scene abruptly and at a time when resources for research are constrained but scientific opportunities abound. Given these characteristics and the timing, we should not be surprised that it has stimulated controversy.

Consider first three basic ways that the SDI program may have an impact on campus-based research and graduate education. It may influence research *direction*, research *funding* and *conduct* of research.

While broad research objectives are set as public policy via the authorization and appropriation processes of the House and Senate, the scientific community normally participates extensively in the allocation decisions for what specific research to pursue. Their participation may be formal as in the National Institutes of Health (NIH) and National Science Foundation (NSF) processes or more informal as usually used by the Department of Defense (DoD) and the Department of Energy.

In American universities, there is a long tradition that the choice of research direction is the province of the individual faculty member. It is not dictated by the department head, dean or central administration.

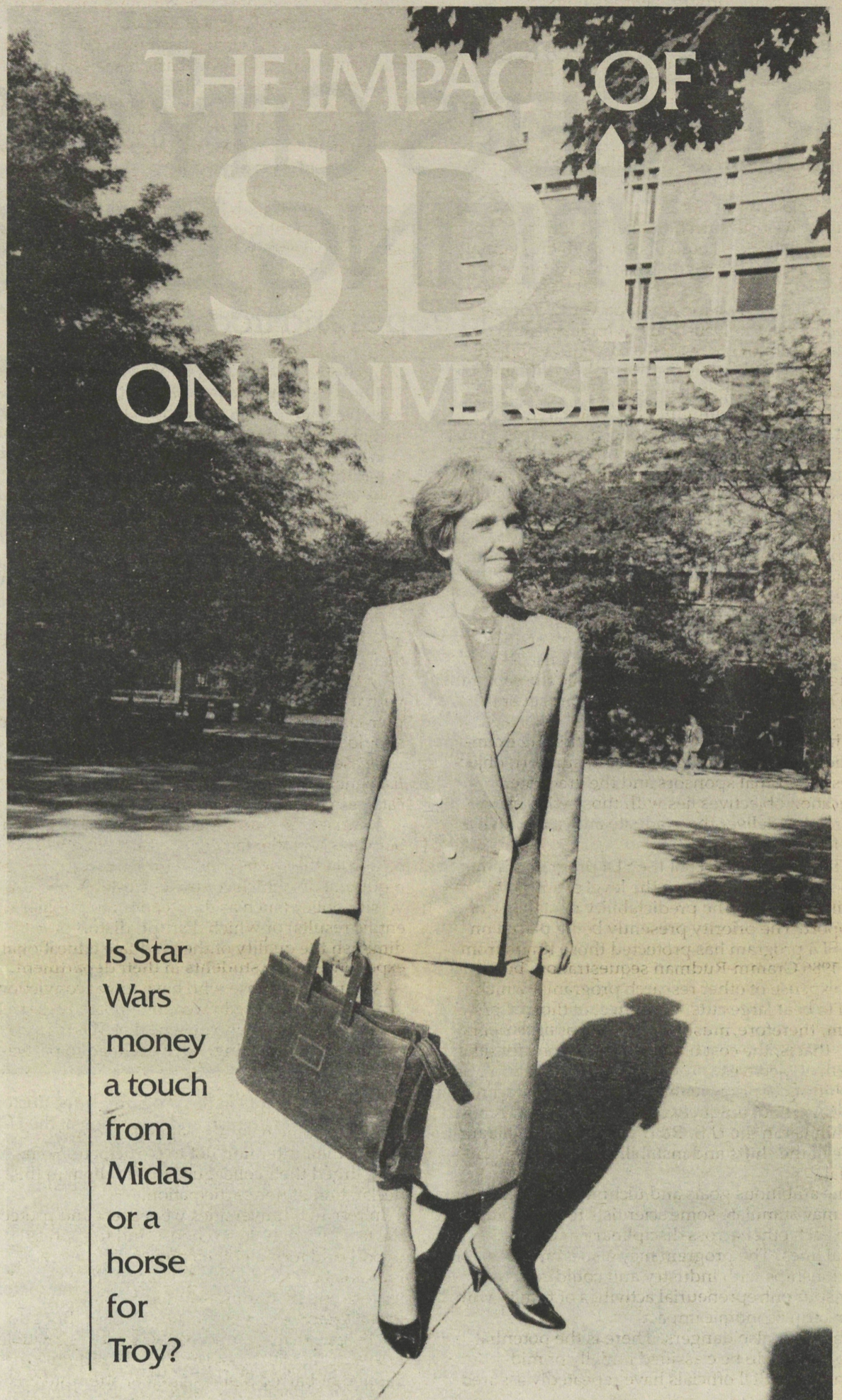
Some adjustments to this tradition of individual choice have been accommodated — in the land grant colleges, where some external direction is acceptable, and, of course, faculty do find it acceptable to respond to requests for proposals to conduct a specific scope of work. The choice to respond, however, remains with the individual faculty member, at least in the first order.

Our nation's science support system was explicitly designed to place this choice in the hands of the individual, not the institution. This system, which differs from that in many other countries, has served us very well indeed.

The magnitude of the resources being made available in the SDI program can, indeed they are undoubtedly intended to, attract investigators to work on the specific research problems in areas relevant to that overall objective. For some investigators, no change in research direction is involved. But for others, the availability of funds will stimulate interest in a new direction.

The stimulation of large funding opportunities and the challenge of the extremely difficult technical problems can function as a powerful stim-

THE IMPACT OF SDI ON UNIVERSITIES



Is Star Wars money a touch from Midas or a horse for Troy?

LINDA S. WILSON



Rucknagel



Kock

CRITICS SEEK TO WEAKEN CLOUT OF THE MILITARY

Wilson, a chemist who received her doctorate from the University of Wisconsin after attending Tulane University as an undergraduate, says her critics mistook her description of the federal plan to double the total defense R&D funding as a statement of University intent. "They also may not have realized the very long odds in the recent competition for the new DoD program," she says. "The probability of receiving all we applied for is close to zero."

The entire amount of URI money available for all universities is about \$110 million for this year. In June, the University was awarded three DoD contracts that were expected to total from \$20 million to \$32 million over five years. These contracts may double the usual 5 percent share of military funding in the U-M's total research funds over that period. The National Institutes of Health and National Science Foundation (NSF) provide about 75 percent of the U-M's external R&D funding.

In regard to the re-examination of the U-M's policy on classified research, Wilson notes that the Regents requested that the faculty and Executive Officers review the 10-year-old Regental Bylaw on Classified Research. The U-M does not now curb military research unless it fails to comply with the Bylaw (see box). That policy limits the length of time a sponsor may

restrict publication of the results of such research, prohibits classified research aimed at destruction of life and requires disclosure of the sponsor and purpose of any classified research projects U-M researchers accept.

Last August, the Regents requested a review of this policy, established in the early '70s and modified in 1976. Regent Thomas Roach commented that the restrictions reflected opinions formed in opposition to the Vietnam War. A 12-member faculty and student review committee completed its deliberations and filed majority and minority reports with President Harold T. Shapiro just before Michigan Today press time.

The majority report, signed by nine committee members, drafted a revised policy that would be extended to cover all sponsored research on campus and not be restricted to classified research alone. The proposed policy would prohibit long-term restrictions on publication of any kind of research accepted by the University. The proposed policy also deletes the "end use" provision in paragraph 3 (see box) of the current policy and eliminates provisions for panel and committee review of research proposals.

The minority report, filed by three members of the committee, disagreed with the majority's extension of the policy to cover all research contracts, accused the majority of failing to

THE UNIVERSITY'S new vice president for research, Linda S. Wilson, has had a busy first year dealing with the shrinking federal funding for research, a stringent state budget and a series of controversies over U-M's military research policies.

During her brief tenure, three issues — SDI, the Pentagon's new University Research Initiatives (URI) program and a re-examination of the U-M Regents' curbs on classified research — have upset some students, faculty and staff.

University investigators applied in 1985 for \$183 million in URI money over five years, a figure that disturbed some faculty and students, who pointed out that U-M received \$7.7 million in DoD funds in 1984-85. A column in the Michigan Daily accused Wilson of trying to double military funding on campus.

ulus to scientific progress with benefits for both civilian and defense objectives. We have seen evidence of such powerful stimuli in prior periods of our R&D history, as for example in the space efforts and in the biomedical research efforts.

Because one of the primary functions of university-based research is its role in graduate education, the nature and degree of research direction change stimulated by SDI funds must be examined in terms of that program's fit with the educational objectives.

Excessive concentration of effort toward very narrow objectives could distort graduate training and shortchange the students, their future employers and the nation. There are those who believe that excessive focus on space and defense objectives in the 1950s and 60s impoverished our civilian technology resource base and leadership and is one of the roots of our present difficulties in economic competitiveness.

While the total amount of SDI research support, or even total DoD support or industrial support, may be modest in terms of an institution's overall portfolio, if that support is focused in only one or two departments and if it is the only support in the department, the range of choices for faculty and students in terms of the research problems they address will be curtailed. The choices may be sufficiently distorted that the quality of the graduate education delivered will be adversely affected.

It is for this reason that many in universities have watched with dismay as the defense R&D budget has increased markedly while the civilian R&D budget has declined over the last several years.

The major responsibility for continuing examination of the fit among sources of support, objectives of external sponsors and the graduate education objectives lies with those who are charged to deliver the graduate education, that is, the faculty.

The principal effect of the SDI program on the funding of research is on the level of support available and on the predictability or stability of support. The priority presently being placed on the SDI program has protected those funds from the 1986 Gramm-Rudman sequestration, but at the expense of other research programs, which had to bear large cuts. One effect of the SDI program, therefore, must be reckoned as *opportunity cost*, that is, the cost of research foregone for other worthy objectives.

Shifting of priorities and instability in research funding is not uniquely caused by SDI and is not unfamiliar in the U.S. R&D scene. But the magnitude of the shifts and instability at present is unusual.

The ambitious goals and technical challenges of SDI may stimulate some scientists to collaborate with each other across disciplinary and institutional lines. The program may also stimulate new relationships with industry and could conceivably spur entrepreneurial activities of faculty with near-term economic impact.

There are also dangers. There is the potential for SDI work to be classified initially or mid-stream. The SDI officials have repeatedly assured

university researchers that although much of the funding is in the Advanced Development portion of the Department of Defense budget, the intent is to leave unclassified the basic research done on university campuses for SDI.

DoD officials cannot promise nonclassification because U.S. statutes preserve the right for the government to impose classification if national security considerations require it.

The issue then is a matter of probability and, to a certain extent, faith in the SDI officials' continuing commitment to preserve the freedom of publication of scientific communications coming from this work. The controversy within the DoD about this issue contributes to the academician's unease.

The other major consideration is the consequences of midstream classification on an individual's research program and research team. Many universities would have to terminate the SDI research agreement if classification were imposed in contradiction to university policies that require open publication of research results.

In such situations, the university must be free to terminate without default or penalty, and the costs incurred or irrevocably obligated must be reimbursed.

And finally, the sponsor may, because of the relationship of the work to national defense, attempt to impose restrictions on the participation of foreign nationals. Universities find it difficult, both physically and philosophically, to impose limits based on national origin for participation in their learning and research activities.

To the extent that the SDI work does not bring with it these interventions in normal university prerogatives or freedoms, the conduct of research should not be adversely affected.

Please note carefully that I am describing *potential* benefits and *potential* trouble points. I am not cataloging data on actual experiences.

Again let me emphasize that the first responsibility lies with the faculty to assure that they accept from the sponsor no contractual or informal requirements which contravene established university policy (such as the freedom to publish scientific results) or which disrupt, distort or diminish the quality of the graduate educational experience of the students in their department.

A number of those who have moral convictions against participating in weapons-related research on campus, those who believe that SDI research is in itself destabilizing, have declined to participate in SDI research. Some of those firmly believe that the project is infeasible on technical grounds. They have exercised their right not to pursue such research. Some have also signed resolutions declaring their intention not to participate. Some have urged their colleagues to join them in this declaration of nonparticipation.

In research universities we respect and protect the faculty's right to so choose and to express openly and formally their choice. These are expressions protected by our Constitution in the latter case and by tradition and sometimes duly promulgated policy in the former case. But I do not believe that any university faculty as a whole, or any university as an organizational entity, has banned or barred SDI research or attempted to

persuade faculty to undertake the SDI research objectives.

It would, in my view, be quite wrong for a university officially to take either of such actions. It would intrude deeply on faculty prerogatives for the university as an organization to intervene.

In my view we need to encourage informed choices about research through discussion and debate of controversial issues. We should not impose institutional bans on research of certain types. Nor should we officially endorse any particular line of inquiry, except as we do so to accomplish the mission of the institution.

Opponents of SDI seek institutional endorsement of their position. Those who favor SDI do likewise. It is not, I believe, an institution issue. We stand to compromise the extremely important principle of freedom of academic inquiry and the independent role of the university if we acquiesce to pressures from either side.

In summary, SDI is controversial for many reasons and may pose special problems for universities. The primary locus of responsibility of choice to conduct SDI research lies with individual faculty members. We must encourage them to make responsible choices. We must accept and indeed encourage genuine debate on these issues. We must also recognize that one important way to express our opinion is through our elected representatives who make the broad choices for the nation.

We should not attempt — beyond what is mandated by applicable laws and regulations — to impose university-wide limitations on the substantive focus of inquiry. To do so jeopardizes an important function of a societal institution: the university as a seeker of truth wherever it may lead.

U-M POLICY ON CLASSIFIED RESEARCH

(Adopted by Regents in March 1972. The following excerpt includes editorial changes made in October 1976.)

In an ideal university existing in an ideal world, all scholars would be free to select their own spheres of inquiry and there would be no restrictions imposed, either externally or internally, on their freedom to publish or otherwise disseminate the fruits of such scholarly activities.

But for the university existing in contemporary society, the matter of classified research poses a choice between two limiting alternatives. If the university elects to participate in classified research, the principles of free discussion and full dissemination must be compromised. If it elects not to participate, the full freedom of scholars to select areas of investigation of their own choice is potentially denied to some.

The disadvantages of complete elimination of classified research at the university are deemed to outweigh the disadvantages of participation in areas where some limited restrictions exist on freedom to disseminate some of the results of research.

It is, therefore, the University's policy to accept classified research within the confines of the following provisions:

1. A research contract, grant, or agreement which is classified only for one or more of the following reasons shall not be construed as one which "limits open publication of results" as that phrase is employed herein:

a. One classified or otherwise restricted solely for purposes of providing access for the researcher to classified or other restricted documents, equipment, or facilities.

b. One which restricts only the publication of certain items of information, such as numerical constants or equipment parameters or settings, that are identified by the research in the course of his investigation but which are not essential for open publication of the results.

c. One which merely requires a review of reports of the research prior to open publication to insure that (i) classified or otherwise restricted information to which the research has or has had access as in (a) above, and/or (ii) items of information as specified in (b) above will not be compromised by the publication of such reports.

2. The University will not enter into or renew any agreement or contract, or accept any grant, that limits open publication of the results of research beyond approximately one year. This general policy will be suspended only in cases (not already covered in 1 above) where the proposed research is likely to contribute so significantly to the advancement of knowledge as to justify infringement of the freedom to publish openly. In all cases, the burden of proof rests with the members of the University community who propose or plan to carry out the research.

3. The University will not enter into or renew any agreement or contract, or accept any grant, the clearly foreseeable and probable result of which, the direct application of which, or any specific purpose of which is to destroy human life or to incapacitate human beings.

4. The University will not enter into or renew any agreement or contract, or accept any grant, which would restrain its freedom to disclose (a) the existence of the document or (b) the identity of the sponsor, and if a subcontract is involved, the identity of the prime sponsor.

5. The University will not enter into or renew any agreement or contract, or accept any grant which would restrain its freedom to disclose the purpose and scope of the proposed research. This policy will permit informed discussion within the University concerning the appropriateness and significance of such research.

"balance the ideal of openness against the ideal of freedom" and opposed the majority's establishment of specific time limits concerning restrictions on publication and review by contract sponsors.

Comments on the two reports are to be submitted to Vice President Wilson by the end of fall term 1986, with review by the Regents expected sometime during winter term 1987.

Meanwhile, some faculty, students and staff are urging the University to prohibit all research whose aim is to find ways to destroy human life. Wilson believes that the principle of academic freedom could be compromised if they are successful.

Among the members of the U-M community who disagree with Wilson on this latter point is Donald L. Rucknagel, professor of human genetics and acting chairman of that department.

"Academic freedom is not absolute and never has been," Rucknagel observes. "Research is not a pure, unfettered enterprise with no values and with none of us telling others what they can't do." He cites the example of the Medical School's restrictions on studies that would take unjustifiable risks with animal and human subjects.

Rucknagel regrets that Congress, in its effort to help upgrade the country's decaying university infrastructure, gave the Pentagon rather than the National Science Foundation so much research money to dispense. He says universities are being converted into weapons-development laboratories and maintains that universities "shouldn't be training their students on projects whose purpose is to kill people."

He emphasizes, however, that his quarrel is not with Vice President Wilson, but with fellow faculty members in the School of Engineering and elsewhere who advocate loosening the restrictions on military research. He is hoping that Wilson will take a neutral stance and let the faculty settle their differences among themselves.

Ingrid Kock ('87) a former Michigan Student Assembly military research advisor, charges that the U-M administration has ignored the University community's consensus against weapons research.

"In 1983," Kock says, "the Michigan Student Assembly and the Faculty Senate voted to bar all research destructive to human life. The Regents overruled this decision and paved the way for the present militarization of the University."

Kock believes the Pentagon launched URI "specifically to tighten its control over University research." In other criticism of the funding program, she commented: "U-M engineers will now be training at Pentagon centers, while U-M grad students who are not U.S. citizens will be barred from participating in U-M URI research projects. The new URI and Star Wars research contracts are problematic not only because of the Pentagon's increasing control over the University, but also because this research contributes to an increasingly dangerous arms race. Performing the preliminary work on destabilizing weapons systems should not be part of the University mission. It is crucial that students, faculty and alumni demand that their consensus against destructive research become University policy." — Elizabeth Brater

THE CAVES OF AJANTA

By Suzanne Ramijak

If the Roman Colosseum was built in 10 years and Chartres Cathedral was completed in a generation or so, how long did it take to carve the Caves of Ajanta — 20 years or 200? Such questions pose a challenge for art historians like Walter M. Spink, who must, without recourse to precise chronological records, determine how long it took to construct magnificent monuments of the past.

The 1,500-year-old Caves of Ajanta, a parabola of Buddhist devotional halls carved from a rocky cliff, are India's most famous tourist site after the Taj Mahal, but for Professor Spink they are "one of the three or four most remarkable creative achievements in human history."

Spink has reached this conclusion after 20 years of research on this royally commissioned monastic complex. His research has been aimed at a revision of the halls' chronology. While earlier scholars held that the main phase of Ajanta's construction spanned two or more centuries, Spink has sought to prove that it developed in a burst of activity lasting less than 20 years.

Misleading Visit from Persia

"The original dating stems from a misinterpretation of a cave mural which depicts a group of Persian-looking figures," says Spink. "It was reasoned that, since a Persian delegation visited India in the year 625, the caves must have been in progress during the 7th century."

Spink claims that aesthetic, historical and technological data prove otherwise. Though a few experts still subscribe to the initial date, others are slowly accepting Spink's estimate, an estimate that fosters a new understanding of Ajanta's historical significance.

Spink's analysis of the Buddhist sculpture, painting and architecture in the caves, and of inscriptions and historical documents, has uncovered a consistency of style and iconography that bespeaks a brief period of patronage and production.

Spink believes that the site's florescence coincided with the reign of a single emperor, Harisena of the Vakataka Empire in Central India.

"Harisena, who ruled between A.D. 460 and 480, was by far the most powerful and important ruler in India, and indeed the world, at that time," Spink says. "He is said to have been an ideal ruler, virtuous, pious and generous."

Through his policies he stabilized India and dominated half the subcontinent. Furthermore, the period in which Harisena ruled was the richest and most assured of India's artistic past, a period often referred to as India's Golden Age.

"Given the wealthy patronage of Harisena and others, and the fervent piety and artistic talent of the time, it is reasonable to conclude that Ajanta could have materialized in a brief 20 years."

(Continued on page 10.)



SEVERAL OF a thousand Buddhas who fill the shrine area in Cave 2. They illustrate a tenet of the developed form of Buddhism (called the Mahayana phase) that flourished at the site in the 5th century, whose devotees believed that the Earth and various heavens were permeated by multiple manifestations of their deity.

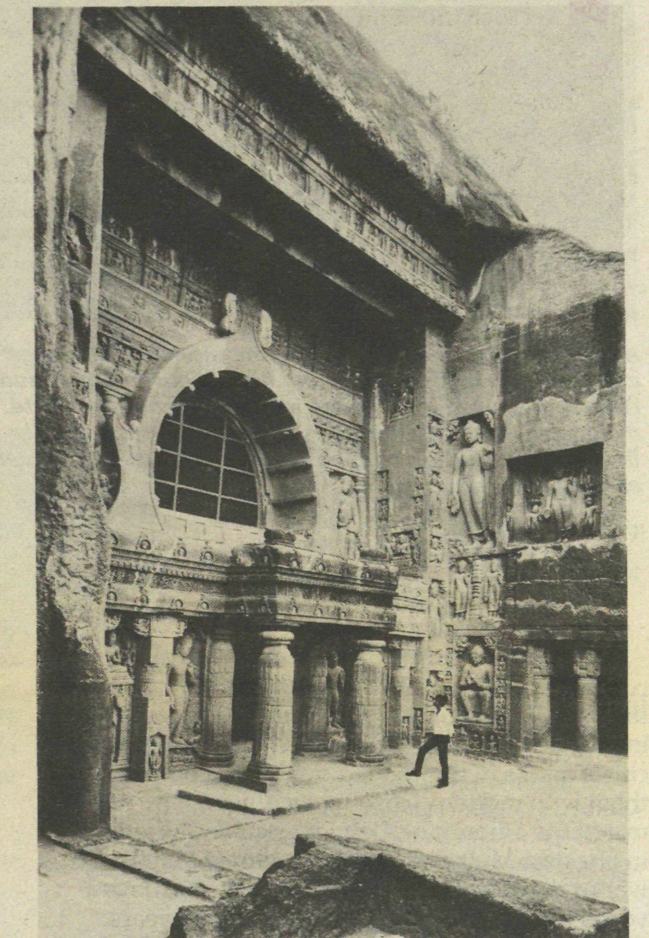
Carved 1,500 years ago in a remote dead-end ravine, Ajanta's rock-cut halls are a lavishly illustrated textbook of India's past.



COMING UPRIVER from trade routes, pilgrims and monks in ancient times took this approach directly to the earliest and most accessible caves at Ajanta. These were the Hinayana caves, built 100 years before the birth of Jesus and five centuries earlier than the 25 major caves constructed in the 5th century.



ASSOCIATED with the thunderbolt and representing the forceful nature of Buddha, this figure in Cave 1 is paired with one representing Buddha's compassionate nature.

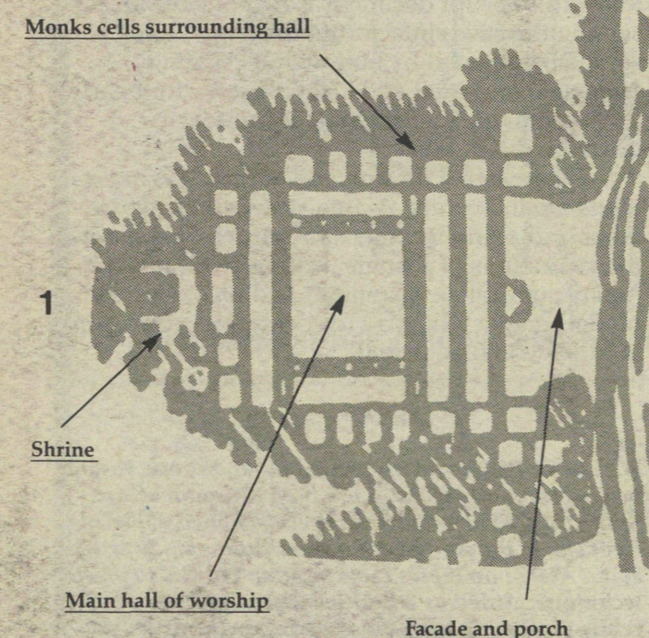


FACADE OF Cave 19, a lavishly decorated hall of worship donated by a vassal king of Emperor Harisena. Standing in front is Dr. Suresh Vasant, research associate of the U-M's Center of South and South East Asian Studies. Currently a visiting Fulbright scholar at the U-M, Vasant is an authority on the history of the site and has been working with Professor Spink for 20 years.

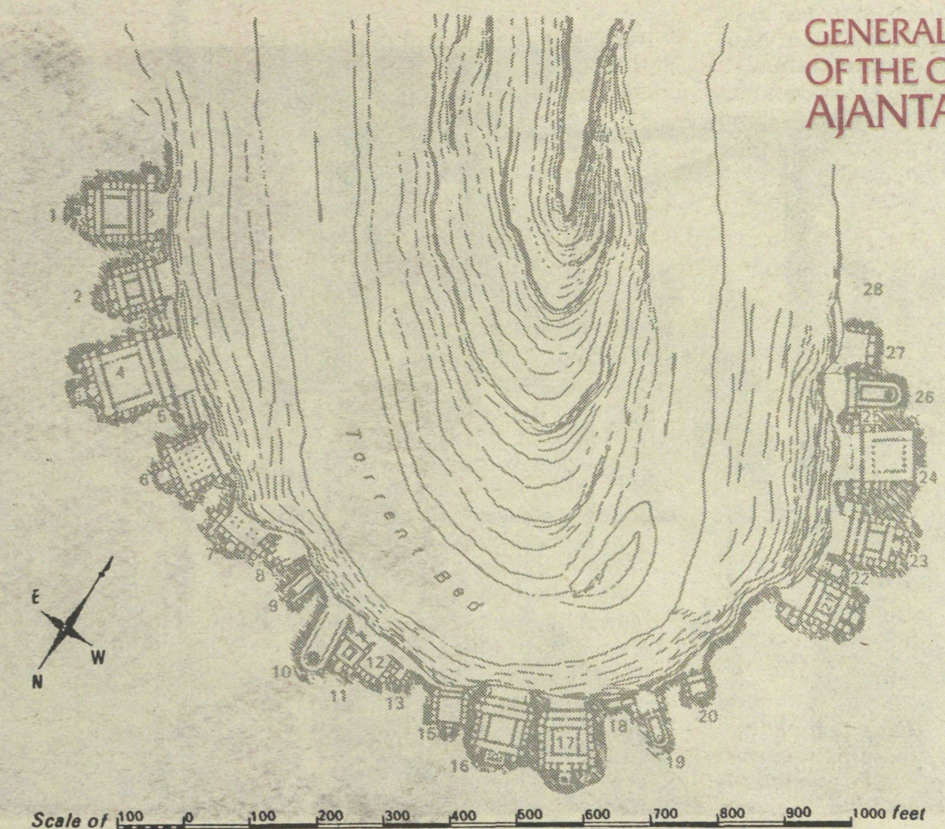


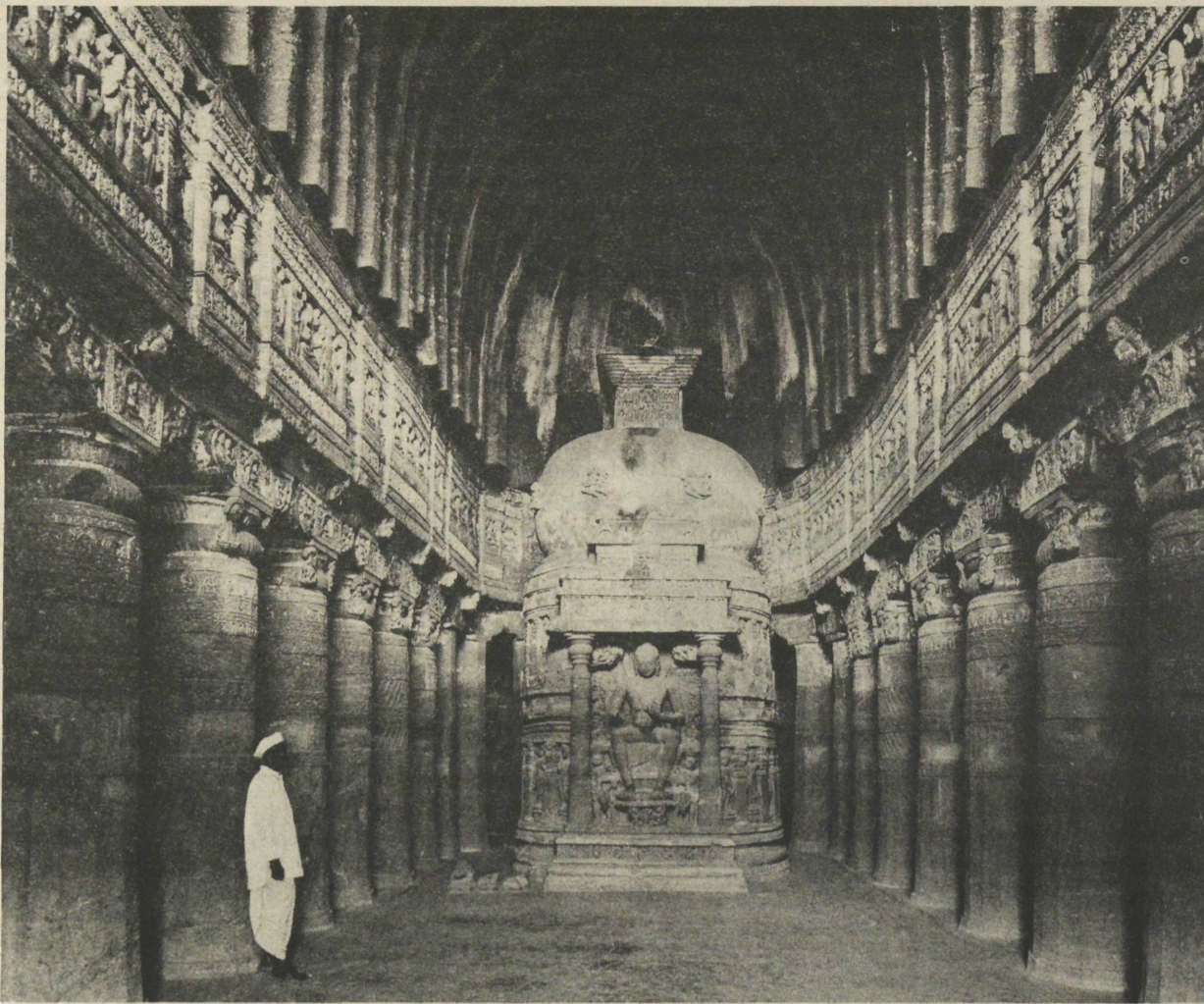
THIS LOVING PRINCE is probably the Buddha in one of his previous incarnations as Visvanatra. According to mythology, he was repeatedly tested by the Gods, who challenged him to give up his palace, wife, children and kingdom as proof of his faith. He did.

DETAIL OF TYPICAL FLOORPLAN



GENERAL PLAN OF THE CAVES OF AJANTA





A RICH MONK, Buddhahadra, commissioned this magnificent worship hall in Cave 26. He left this inscription explaining the motivation behind his and other patrons' funding of Ajanta: 'A man continues to enjoy himself in Paradise as long as his memory remains green in the world. One should therefore set up a memorial in the mountains that will endure for as long as the moon and the sun continue.' These sentiments notwithstanding, Buddhahadra sided with the rival dynasty that precipitated the fall of the Vakataka Empire and discontinuance of Ajanta's construction.

(Continued from page 8.)

Computing the Chiseling

Spink also supports his chronology with more concrete evidence. He has attempted to calculate the number of workers at the site and the approximate rate at which they worked. By examining chisel marks in unfinished caves and comparing them with modern working techniques, he estimated the amount of rock a worker could remove in one day. Multiplying this by a force of 100 workmen, laboring eight hours a day 300 days a year, Spink arrived at a figure close to 12 years. This span, plus the additional time needed for decorating the caves, yields a rough total well within the suggested 20 years.

As well, Spink points to the Palace at Versailles. That monument, with its roofed area of 17 acres, was approximately 25 years in the making, "a feat that makes Ajanta's rapid achievement seem entirely plausible."

To appreciate fully the magnificence of Ajanta's construction, regardless of how long it took to carve and decorate it, one need only consider the site's topography and the challenges it presents.

"The caves were carved out of a cliff at the

mouth of a dead-end ravine 200 miles northeast of Bombay," Spink notes. "Though spurred on by wealthy patrons, the artists assigned to carve the rock had never done such excavation before. While they were highly skilled craftsmen, many of whom were royal court artisans, none had ever faced the challenges of rock cut architecture."

The Craftsmen's Confidence

In the halls' varied structure, Spink sees a record of the craftsmen's growing confidence. "From cave to cave one can trace an evolution from simplicity to greater complexity in the handling of materials," he observes. "The initial work on columns, windows and porch facades is rough and cursory, gradually giving way to more intricate and sophisticated designs." While the varying degrees of sophistication have been cited by earlier scholars as evidence for a 200-year chronology, Spink reads them as signs of the craftsmen's rapid evolution, as they moved from diffidence to exuberance in a few short years.

The processes of growth that the caves record—

technological, stylistic and iconographic — were fed by factors other than the growing confidence of craftsmen. Wealthy and courtly patrons, competing for both worldly and spiritual status, lavished money and energy on these Buddhist caves. Usually commissioning one cave, but sometimes as many as three or four, patrons strove to outdo each other in the extravagance and splendor of their halls.

The Way of Siddhartha

Since the caves were commissioned by royal patrons to "rival the palace of the lord of the gods," as one cave inscription reads, they were modeled after contemporary palace structures, providing a record of 5th century architecture and decor. A similar wealth of historical data is found in the caves' paintings, which often depict the Buddha as the young Prince Siddhartha or in earlier incarnations, when he indulged the worldly pleasures of court life.

Along with the strong influence of patronage, Spink also detects the presence of other cultural traditions. "These influences were probably brought to the site by pilgrims, monks, traders and artisans who traveled on the nearby trade routes," he explains. "These outside influences are found in the rich variety of painting styles, reflecting the artistic tastes of distant provinces." Spink reads this diversity as a simultaneous creative flourish rather than a gradual progression in time.

The most immediate and accessible feature of the caves is their carved rock sculpture. A host of lesser divinities, devotees, animals and floral motifs are elaborately represented throughout this monolithic complex, but the most prominent sculptures, dominating the central shrines, are images of the Buddha.

"As embodiments of human perfection, these Buddha figures provide insight into Indian ideals of beauty," Spink says. "Rendered in an idealized fashion, with smooth rounded limbs, they are admirable 'vessels of light and air.'" While this ideal existed in India long before the 5th century, it was only during India's classic age that it became fully realized in Indian art.

The Perspective From Alexandria

The paintings on the caves' walls and ceilings provide the only surviving examples of the narrative genre from this rich artistic period. Amid the crowded and colorful compositions, one finds both Buddhist and Hindu iconography, pointing to the coexistence and crossbreeding between these two major religions. Stylistically, the paintings reveal a growing mastery of perspective, "a feature of Alexandrian culture that was gradually imported along trade routes from the West," Spink says.

Just as remarkable as the caves' quality and feverish production was their abrupt decline. "With the collapse of the Vakataka empire and the outbreak of feudal wars," Spink explains, "Ajanta found itself without patronage; it was soon abandoned by the artists and monks, who left to find support in more stable regions."

At the site's disruption in 480, half the work remained unfinished, providing historians a rare glimpse of working plans and procedures. "Ironically, this abrupt decline was responsible for preserving the caves intact until this day," Spink says. Partly buried by fallen rock, Ajanta remained abandoned and lost to history for nearly 1,300 years, until a British tiger hunter re-discovered it in 1819.

Spink says that for him and others who are attentive to its secrets, Ajanta sums up the entire ethos and aesthetic of Indian culture, "preserving the aspirations of a single, intensely creative period of cultural development and providing a model against which all later cultural expressions in India would be tested."



WALTER SPINK and his associate, Dr. Suresh Vasant, inspect Indian artifacts in the U-M Museum of Art. Spink calls Ajanta 'the most precisely analyzable ancient site in the world.' He has written some 20 articles about Ajanta on topics ranging from politics to plaster technique. Aided by a Smithsonian grant, he is currently producing a five-book series on the caves' patronage, imagery and evolution.

LETTERS

The pleasure of recognition

NOW THAT I have two copies of the June 1986 *Michigan Today*, I will enjoy sharing them. I knew Professors Sadler and Cooley of the Department of Naval Architecture and Marine Engineering when I saw them; I was in college when Robert Frost brought the other poets here; I knew Stella Osborn. The coed to the right (on the Whimsies board) is my oldest friend, Frances Swain Hayne, and the one to the right of her is probably Yuki Osawa. (Computers could save the U-M a lot of paper and postage if they could decide that the two addresses recorded on the reverse of this card represent just one person.)

Marjory H. Drake
Ann Arbor

We thank you and other readers for attempting to eliminate duplicate mailings. Despite our computers (or because of them), this goal is still impossible in cases where individuals' names are on the data bases of two or more computers. We cannot remove such names from any of the data base lists without affecting mailings by other U-M units. We regret this and hope readers will pass the extras along to nonrecipients. — Ed.

A question of evil

BERNARD W. Gamson's excellent question (letter, June), "Why do the lead articles in *Michigan Today* give credence to 'evil geniuses' (Soviet and Moslem leaders) of our age?" deserves to be answered. Irving Kristol offers one explanation in "American Universities in Exile" (editorial pages, *Wall Street Journal*, June 17). It is time that alumni and friends be let in on the little secret that, according to Kristol, "The faculties at most of the major universities and prestigious colleges... have moved rapidly and massively to the left" over the past two decades.

Cyrus J. Sharer
Graduate School '55
St. Davids, Pennsylvania

ROBIN Wright warns [in the March issue's "Sacred Rage"] that we must better our relations with militant Islam, but she fails to tell us what the bastards want. Beyond killing us and Western ideas, I doubt they know themselves. This was not a very helpful article and you will want to do better. More accurately, she will. I enjoy the publication, especially the earlier lead story on Roman life.

Robert Guritz
Chicago

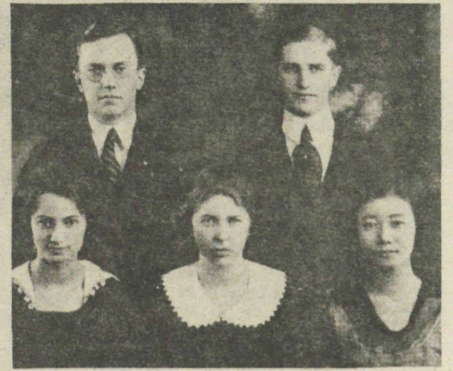
Delighted by 'God'

I WAS delighted to read your excellent article "Who Killed God?" in the March issue. It is not easy to analyze, explain and interpret a book as profound and complicated as James Turner's. You did it in a most effective and enlightening way. Every reader should be grateful for the valuable new philosophical and religious perspectives you provided. Such a stimulus to thought in religion is much needed and most timely. The article reminded me of Thomas Jefferson's admonition: "Question with boldness even the existence of a God; because, if there be one, he must more approve of the homage of reason than that of blind-folded fear."

I had planned to write you earlier, but did not get around to it. However, after reading in the June issue the letters commenting on your article, I was prompted to write. I was appalled by the stereotyped fundamentalist attitudes revealed in most of the letters. Aarre K. Lahti's was a wonderful exception. Lahti has done some thinking.

Michigan Today has become a highly interesting and stimulating publication. I hope that you will continue to produce articles that will generate thought and challenge outmoded stereotypes.

Wendall W. Haner
Mountain Home, Arkansas



EDITORIAL BOARD of Whimsies, a U-M literary magazine of the '20s, included (front row, l-r) Stella Brunt (Osborn), Frances Swain (Hayne) and Yuki Osawa (Otsuki), and in the rear, Lyndon Babcock (l) and Lawrence H. Conrad.

Osborn prompts nostalgia

THE ARTICLE by and about Stellanova Brunt Osborn in the June 1986 issue was a shock of nostalgic *déjà vu* for me. Until I read that piece I did not know that *The Inlander* had been discontinued in 1919, nor did I know that Robert Frost had been poet-in-residence once before in 1921-1922, as he was once again in 1927-1928 when I was a freshman in the Literary College.

In 1928 *The Inlander*, revived in 1925-1926, once again had expired after publishing two slim issues that school year. My U of M roommate, Harold Courlander of Detroit, and my childhood friend and schoolmate from Grand Rapids, Harold Silverman, resolved to revive *The Inlander* once again in the fall semester of 1929, and he persuaded me to join them, although I was still on the staff of the *Michigan Daily*.

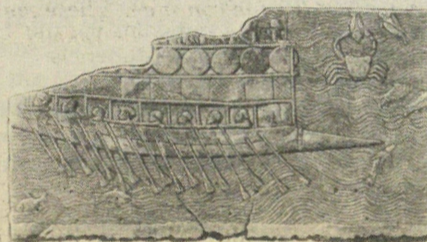
We were able to bring out three issues in 1929-1930 before once again that ill-fated magazine expired, I think forever.

In his graduating year in 1931 Harold Courlander won the major Hopwood Award for essay and the minor prize for a one-act play that was performed in the theater of the Women's League Building. Courlander has been a major American writer for decades, author of six novels, the best known of which is *The African*. His latest novel is *The Master of the Forge* published by Crown Publishing Co. in 1983. He has also written 11 works of non-fiction, including *A Treasury of African Folklore* and *A Treasury of Afro-American Folklore*, acclaimed by critics as the most definitive collections in their field. He is also the author of 13 collections of folk tales and folklore.

With infinite courtesy and forbearance Harold Courlander permitted, over the objections of his publisher, his attorneys and a judge in the Federal Court, his lawsuit against Alex Haley, the author of *Roots*, to be settled privately for an undisclosed amount in connection with the plagiarism of his novel, *The African*, by Haley in his book *Roots*.

Courlander, now approaching his 80th year, continues to write with undiminished vigor in his home in Bethesda, Maryland. For many years he was a senior editor and announcer for the *Voice of America* in Europe.

Morris Alexander
Chicago



PHOENICIAN TILE shows ramming device that is known as a bulbous bow in marine engineering.

The Victors at Sea'

I JUST got your latest edition, and it was as fascinating as ever. It is always a pleasure to read about Ann Arbor. I was one of those who participated in the Coast Guard life jacket test in the towing tank in West Engineering [in the June issue's cover story, "The Victors at Sea," about the Department of Naval Architecture and Marine Engineering]. Boy did that story bring back memories.

Monica Ann Merva BSE '84
East Lansing, Michigan

MY THANKS to you for the article on the Department of Naval Architecture and Marine Engineering. However, I do feel the section on "Bulbous Bows" should be expanded to include the following: My information on this subject indicates that the first serious studies of bulbous bows were conducted in 1921 at what was then called the United States Model Basin, outside Washington, D.C. Further studies were done at the Model Basin during the 1920's by David W. Taylor.

The definitive work on bulbous bows was conducted at the University of Michigan Naval Tank, as it was then known, by our own Prof. E. M. Bragg. Professor Bragg's work was published in a paper entitled "Results of Experiments on Bulbous Bows" in the Transactions of the Society of Naval Architects and Marine Engineers, Volume 30, 1930. I was fortunate to have studied under Professor Bragg when he was chairman of the department in the late 1930's, and will always remember him as a fine gentleman and a great teacher.

R. J. Wheeler
Naval Architecture and Marine
Engineering, BSE 1941
Bartlesville, Oklahoma

Michigan Today

Michigan Today, published quarterly by News and Information Services, The University of Michigan, 412 Maynard Street, Ann Arbor, Michigan 48109-1399.

Jon Cosovich
Vice President for Development and
Communication

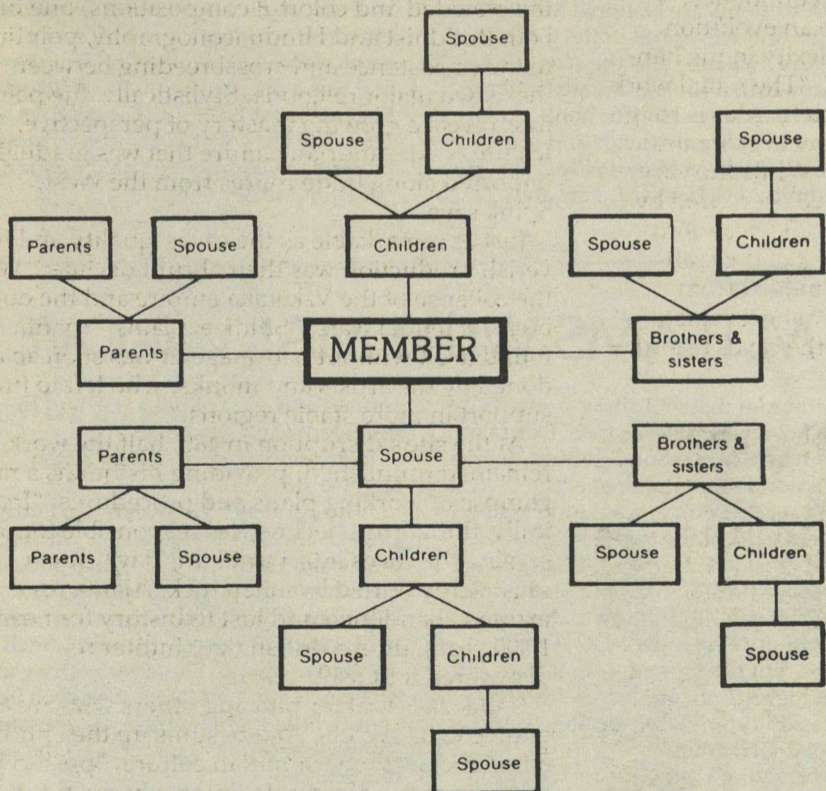
Joseph H. Owsley
Director of News and Information Services

John Woodford
Executive Editor

Margot Campos
Art Director

NOTE: Statements in *Michigan Today* do not represent official policy of The University of Michigan

**Are You A U of M Alumnus?
Do You Live in Michigan?
Then You Can Join U of M Credit Union...
And So Can All Your Relatives:**



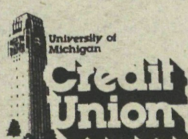
We are worth looking into!
Just send in this coupon and we will tell you more!

To: University of Michigan Credit Union
P.O. Box 7850
Ann Arbor, MI 48107

Please send me more information about U of M Credit Union.

Name _____
Address _____
City _____ State _____ Zip _____

Michigan Today 8/86



THE LEARNING TOOL: AN IDEA PROCESSOR

By Frank Blanchard

Students can type their notes from class into a computer, then use a U-M "idea processor" to study, sort text for term papers or quiz themselves for exams.

The idea processor — dubbed the "Learning Tool" — has many text management features of word processors but also enables the user to demonstrate the relationships between concepts and ideas. Graphics are used to illustrate the text and to indicate relationships between concepts.

Students already are using the Learning Tool developed for the Apple Macintosh personal computer. The software is being field tested by U-M students, faculty and staff before it is made available more widely.

"The Learning Tool is a way of arranging concepts, based on the latest research in cognitive psychology, learning and memory," said John Van Roekel, former manager of U-M's Computer Aided Engineering Network, who worked with U-M education Prof. Robert B. Kozma to develop the program. "It's an electronic notebook that also helps you learn."

The program can be envisioned as stacks of blank index cards waiting to be filled out, cross referenced and filed. But the Learning Tool can be manipulated much faster and in more ways than a stack of cards. For example, the program will automatically find and display text when the user enters a key word.

To set up the electronic notebook, the user creates a "card" by typing a note card name on the left side of the computer screen. That also causes the card name to appear on a card map, which appears in a window on the right side of the screen.

The user can then "open" the note

card, making it expand to fill the computer screen, and create text and graphics.

The map window on the screen can be manipulated at any time to draw lines between the card names, indicating relationships between the concepts they represent.

One way to manipulate the ideas represented on the main display would be to group related names on the map window under a larger heading. This can be done by consolidating a group of card names under a single name on the map window.

"That's an idea process," Van Roekel said. "It's merging a group of ideas into a single, higher-level concept. And it only takes a couple of keystrokes to do that. Your list of terms on the left side is now becoming an outline, with the original card names displayed as subconcepts."

The Learning Tool can be used for different purposes. For practice exams, for instance, the program will automatically blank out key words and phrases from the screen; the user must fill in the blanks.

Kozma said the program is so easy and fun to use that students may not mind typing their notes. It takes about 60 minutes to teach a student to use the program, 90 minutes if the student is unfamiliar with the Macintosh.

The Learning Tool is the first program of its kind specifically designed for use by students on personal computers, Kozma said.

ADMISSIONS

The Undergraduate Admissions Office is hosting receptions for prospective U-M students in many parts of the country in September and October. Locations and dates for the meetings (all at 7:30 p.m. except the Oct. 5 meeting in McLean, Virginia, at 2 p.m.) are:

Boston, Ma., Oct. 1, Boston Holiday Inn, Burlington; **Chicago (North Shore),** Sept. 15, Holiday Inn Evanston; **Chicago (South & West),** Sept. 14, Marriott Inn-Oak Brook; **Cincinnati (Dayton),** Sept. 15, Sheraton Inn Springdale; **Cleveland (Akron),** Sept. 14, Holiday Inn (Akron); **Ft. Wayne,** Sept. 17, Trinity Episcopal Church; **Indianapolis,** Sept. 16, Indianapolis Marriott Inn; **New York City,** Sept. 28, Trinity School; **Philadelphia (Southern New Jersey),** Oct. 8, Marriott Inn-Airport; **Pittsburgh,** Oct. 9, Marriott Inn-Green Tree; **Plainview, NY (Long Island),** Sept. 29, Holiday Inn Plainview (Long Island); **Rye, NY (Westchester and Rockland counties),** Sept. 28, Rye Country Day School; **St. Louis,** Sept. 16, Sheraton West Port Inn; **Washington, D.C.,** Oct. 5, Westpark Hotel, McLean Va.;

For more information, contact Mike Donahue, associate director, Undergraduate Admissions Office, (313) 764-7433.

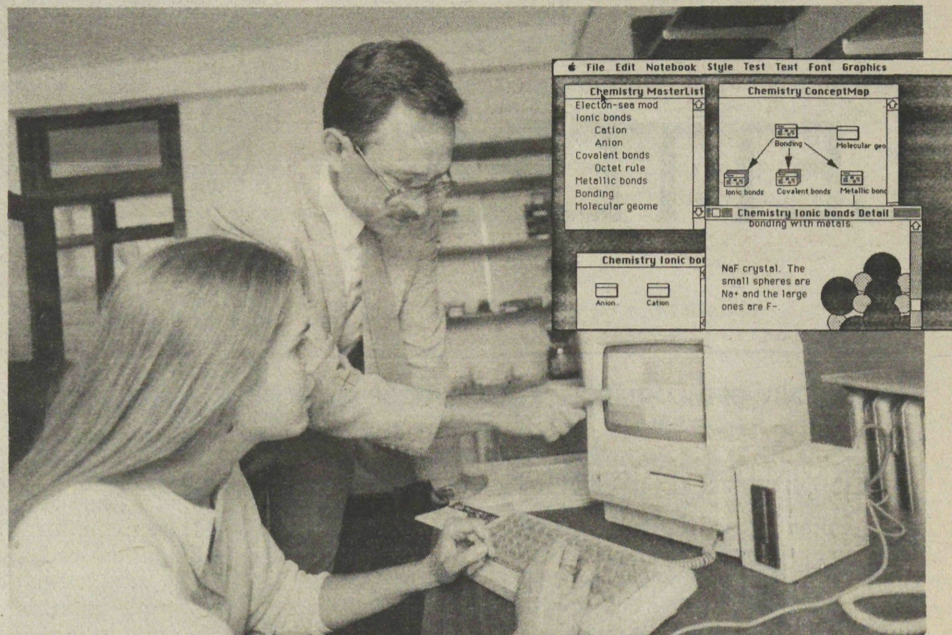
Admissions Policy Modified

The University has modified its admissions practices to ensure that all applicants for the fall 1987 freshman class are fairly considered.

Under the plan, decisions on most applications will be delayed until March 1987, when the size and the quality of the entire applicant pool can be assessed.

Formerly, the majority of qualified applicants were notified of their acceptance within several weeks of their application. Those with marginal qualifications, however, had to wait until March, so that their senior year fall term performance could be evaluated.

This year, several thousand academically able students were not admitted to the U-M in the second round of application reviews because of the record number who had applied to the University, reports Clifford F. Sjogren, director of undergraduate admissions.



ROBERT KOZMA, professor of education, shows secretary Heather Jersild how to use the Learning Tool's note-taking, filing and cross-referencing features. INSET shows sample screen of how chemistry notes can be organized and referenced. More detailed data on any subject on screen is obtainable on command of user.

TWO HIGH SCHOOL SENIORS WIN BENTLEY SCHOLARSHIPS



Marquardt

Rao

Two incoming freshmen from Michigan, Paul Marquardt of Detroit and Sangita Rao of Jackson, will receive the Bentley Scholarship for 1986-87, the University's largest and most prestigious award for undergraduates.

Both students are National Merit Scholars and will enroll in the College of Literature, Science, and the Arts (LSA).

Marquardt, a June graduate from Detroit's Renaissance High School, plans to major in political science and economics in the U-M Honors Program. He was admitted to Harvard, Yale and

Georgetown's School of Foreign Service. Rao, a graduate of Jackson High School, has decided to prepare for a career in the law.

The Alvin M. and Arvella D. Bentley Scholarships recognize the recipients as among the most outstanding Michigan residents to apply to the U-M. The awards, for four years of undergraduate study, cover tuition, fees, room and board, and provide a book allowance. The Bentley Scholarship program awards two new scholarships each spring, maintaining eight Bentley Scholars in any one year.

Established in 1983 by the Bentley Foundation of Owosso, Michigan, the scholarships continue the Bentley family's tradition of supporting educational excellence by providing scholarship assistance to Michigan students.

Alvin M. Bentley ('40), devoted most of his life in public service to the state and nation. He spent the early part of his career with the U.S. diplomatic corps, served four terms in Congress and was a member of the U-M Board of Regents from 1966 until his death in 1969. The University's Bentley Historical Library was completed in 1972 with a gift from the Bentley family.

U-M TEAMS WITH MARYGROVE

A program that will allow students to earn a liberal arts degree from Detroit's Marygrove College and a second degree in an academic area offered at the U-M but not at Marygrove, was launched by the presidents of the two schools.

U-M President Harold T. Shapiro and Marygrove President and U-M alumnus John E. Shay Jr. said the Two-Degree Opportunity Program (2-DO) was targeted — but not limited — to urban, minority high school graduates who have successfully completed a college-preparatory curriculum.

Participating U-M units include dental hygiene, engineering, natural resources, nursing and pharmacy. Other U-M schools are expected to participate in the future.

Basic features of "2-DO" include:

- Enrollment and residency at Marygrove College for prescribed, prerequisite courses (usually 90 semester hours);
- Close collaboration during the Marygrove residency with participating U-M units, including a probable summer term in Ann Arbor.

- Likely admission to participating academic units at the U-M for students who have completed the prerequisite

courses and performed according to predetermined standards.

In announcing this collaboration, Shapiro stated:

"The agreement between Marygrove College and The University of Michigan is an example that collaborative and cooperative arrangements between institutions of higher education can create new and exciting opportunities. Such arrangements can allow Marygrove and The University of Michigan to each become a little more than we are presently, for the whole to be greater than the sum of the parts.

"They also can allow new opportunities for our faculties to be involved with each other, and we can accordingly serve students better. With degrees from Marygrove and The University of Michigan, we think 'the sky will be the limit' for participating students."

Shapiro added that the new endeavor with Marygrove "is but the latest in a long series of efforts by the U-M to make its programs as accessible as possible to all qualified and interested persons, in particular, to persons who are members of one or another group historically underrepresented in our student body."

U-M CLUB EVENTS

Listed below are some events sponsored by various U-M alumni and alumnae clubs around the country. Interested persons may contact presidents of their local clubs for details. U-M Club presidents will be listed in the September/October *Michigan Alumnus*.

Ann Arbor: Sept. 4 kick-off luncheon, speaker Bo Schembechler, contact Chuck Rubin, 665-6688.

Chicago: Sept. 15 begins first of 11 weekly football video luncheons, contact Ernie Sigler, 782-1122.

Cincinnati: Aug. 30 Big 10 pig roast; Sept. 13 TV football party, contact Dick Hurst, 983-6891.

Grand Rapids: Sept. 17 crying towel open, contact Steve Marshall, 774-0907.

Jackson: Sept. 11 kick-off dinner, contact Bill Hansen, 787-4100.

Kalamazoo: Sept. 10 kick-off party, contact Daryl Kimberly, 385-1280.

Lansing: Sept. 9 kick-off, contact Farais Howrani, 323-8020.

Long Island: Sept. 8 Mets vs Montreal, contact John Morgan, 747-1000.

Madison: Sept. 13 Notre Dame game TV party, contact Michael Goode, 836-8618.

Miami: Sept. 13 Notre Dame game TV party, contact Roy Gross, 665-1655.

Muskegon: Aug. 23 family potluck, contact Marti Balgooyen, 780-2605 / 728-4102.

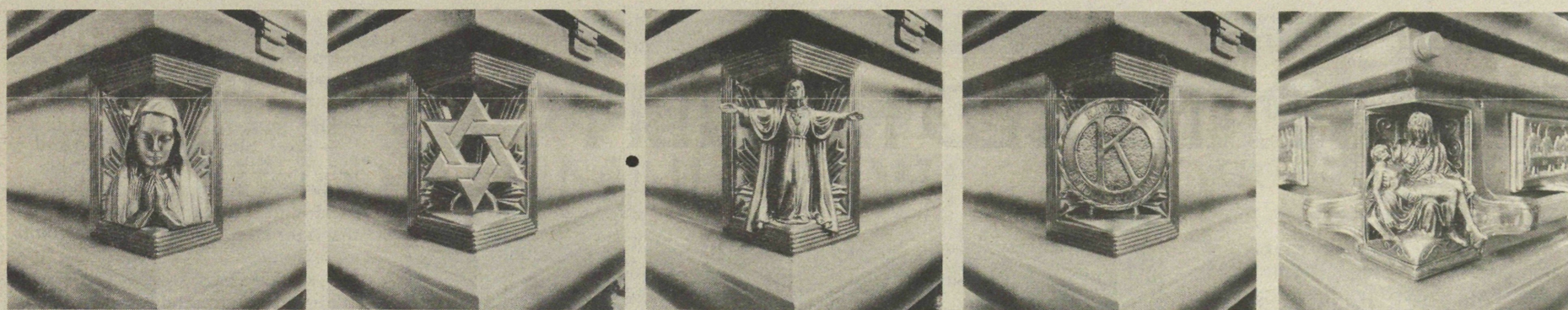
San Antonio: Aug. 24 fall kick-off mixer; Sept. 13 Notre Dame game TV party, contact Gary Graser, 341-9250.

Southern Fairfield Co.: Sept. 13 Notre Dame game TV party, contact Ed Morrill, 790-0770.

Toledo: Sept. 10 M vs Notre Dame smoker; Sept. 11 kick-off luncheon, contact Walt Skotynsky, 241-8811.

Washington, DC: Sept. 11 Capitol Hill reception; Sept. 13 Notre Dame game TV party; Sept. 18 happy hour, contact Don Kredel, 429-2624.

Wine Country: Sept. 6 Tigers vs Oakland A's, contact John Grubb, 577-4333.



Casket Corner Details

DEATH AND DYING IN AMERICA

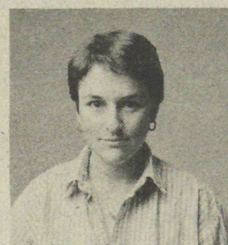
By Janice Levy

I have always been concerned with documenting some parts of people's lives in my photographs. This photo essay on death and dying in America came about as the result of my befriending John Barnwell, a young man in Massachusetts who is dying from internal neurofibromatosis, which is similar to the so-called elephant man's disease.

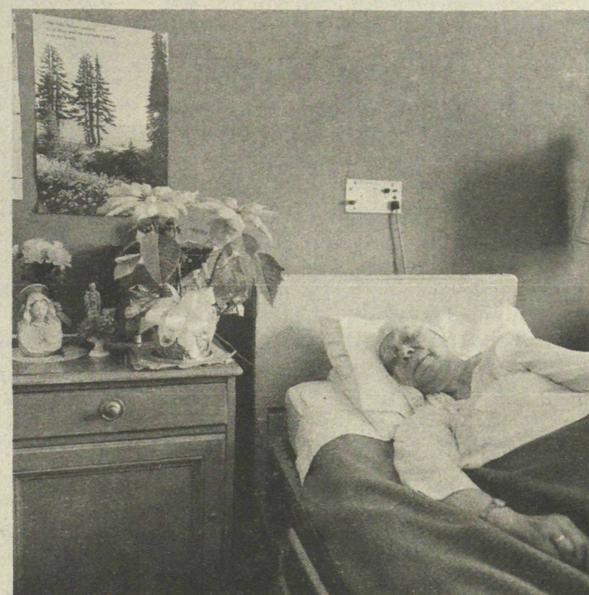
Despite numerous brain surgeries to remove his chronic and progressive neural tumors, John is now totally deaf, almost blind and severely limited in his mobility. Routine activities such as walking, talking and eating are sometimes impossible for him.

Despite his burden John maintains his sense of humor and love of life. It was precisely his courage and his appreciation for the life he was then living that prompted me to photograph other dead and dying people and some aspects of the funeral industry. It was my hope that these images would reveal important facets of the human condition.

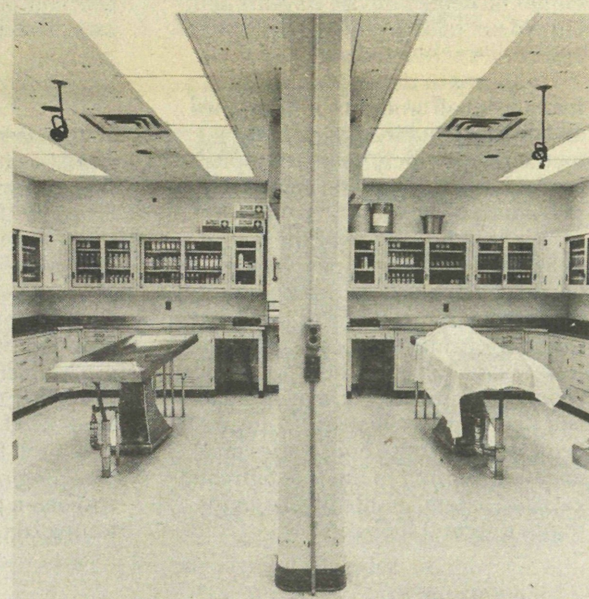
These photographs represent a small fraction of my exploration. Some of the images may be difficult to look at. They are not, however, intended to shock, but rather to prompt an examination of an unavoidable consequence of being human.



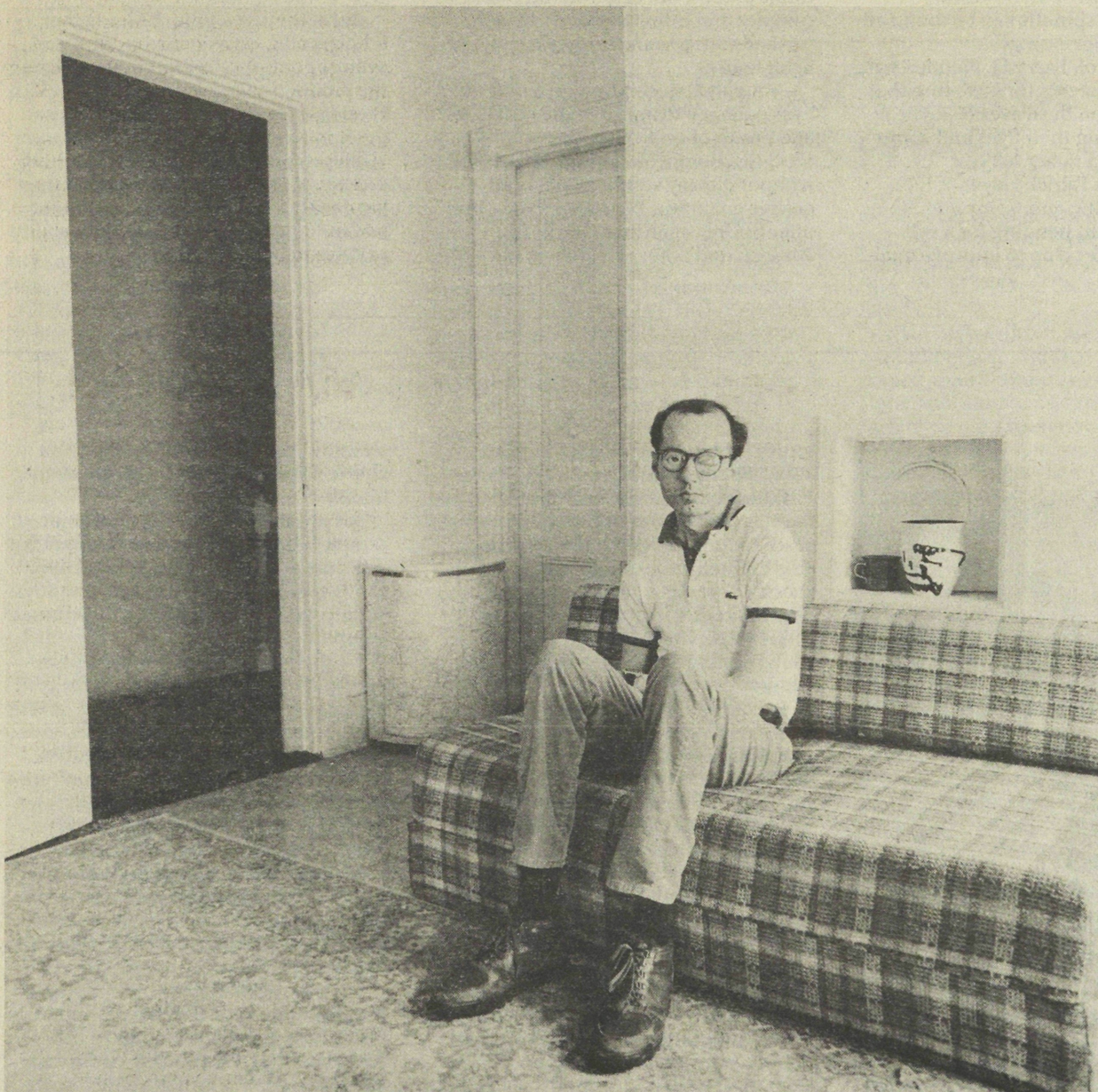
Janice Levy exhibited these and other photographs on death and dying at the Rackham Building this spring, when she received her master's degree in fine arts from the U-M School of Art. She has settled in Ann Arbor and is teaching at a photography school in Lansing.



Sister Willomena, Maria Hall, Adrian, Michigan (1985)



Prep Room, Wayne State School of Mortuary Science, Detroit (1985)



Young Man With Internal Neurofibromatosis, Massachusetts (1985)



Marston Crypt, Michigan Memorial Park, Belleville, Michigan (1986)

U-M'S PATENTED FACULTY

By Frank Blanchard

Since 1980, the University has become more active in encouraging faculty members to size up the commercial potential of their research, and the federal government has pushed for a quicker transfer of technology from universities to the public.

The result has been an increase in the number of patents issued to U-M professors and in the creation of a variety of small businesses to refine and market products conceived in U-M laboratories.

The University itself owns about 75 patents; 30 more are being processed by the U.S. Patent and Trademark Office, and applications for another 10 to 15 are being prepared. The largest payoff for the University, more than \$1 million in royalties, has come from patented head gear used in football helmets manufactured by the Bike company.

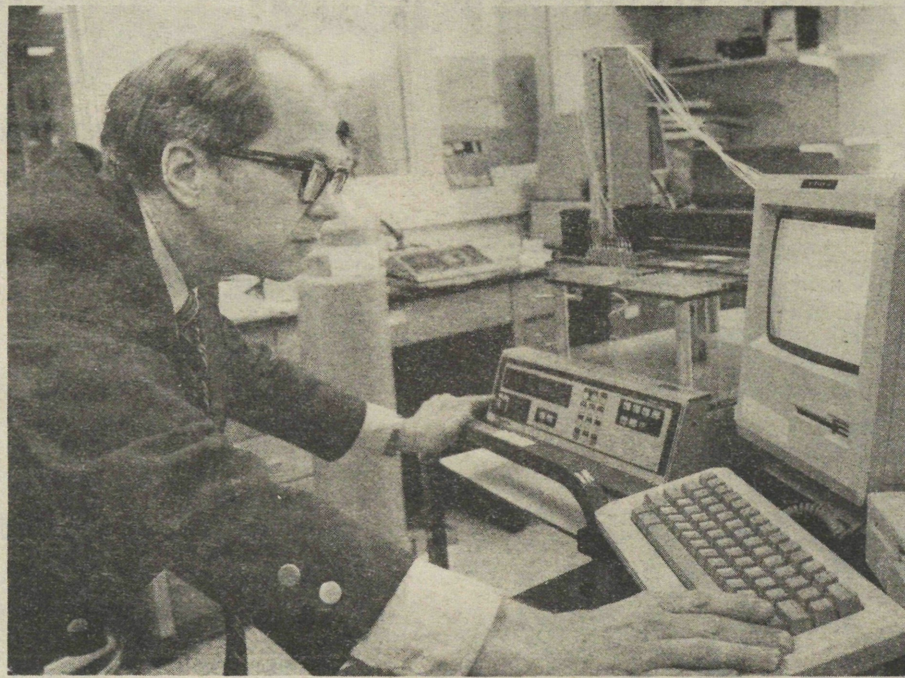
Last year U-M netted more than \$500,000 in royalties, twice as much as 1984. By 1990, royalties are expected to exceed \$2 million a year, says Robert F. Gavin, associate counsel for intellectual properties.

"We have several things right now that could be big money makers, but the outcome is totally unpredictable," Gavin says. "They could begin to bring in significant funds in the next five years. But to say that this will cover research money being lost through federal cut-backs would be misleading."

Prof. A. Rees Midgley Jr., M.D., says he was stimulated to co-found BioQuant of Ann Arbor Inc. last October partly because of seeing biotechnological techniques he helped devise 20 years ago, but did not patent, spread to hospitals and homes across the nation.

He shared in developing a way to measure small amounts of hormones and other substances in the body, a method now widely used in hospitals, research laboratories and some home pregnancy tests.

"We literally gave away the technology to hundreds of people. We taught courses and trained people, many from industrial firms that went on to make fortunes," says Midgley, professor of pathology at the U-M Medical School and director of Developmental and Reproductive Biology. "Now we're being asked to raise our salaries and maintain our unit in times of tight budgets and federal grants. We're giving things a second thought."



THE ENTREPRENEURIAL spirit seized Prof. A. Rees Midgley Jr., M.D., co-founder of BioQuant of Ann Arbor Inc., after he saw biotechnological techniques he helped devise 20 years ago, but did not patent, spread across the nation.

Since 1985, patent applications by U-M professors have doubled, and the number of invention disclosures has risen 30 percent, according to James H. Dautremont, counsel for the U-M Intellectual Properties Office. The office is handling 150 faculty inventions, about 30 of which have demonstrated "significant commercial potential," Dautremont says. The office has also helped faculty members launch 10 small businesses in the past two years.

The College of Engineering, which emphasizes applied science, lists 30 small business spinoffs by faculty and staff and another 44 companies established by U-M engineering and affiliated laboratories in the past 30 years.

Commercial spinoffs can be found all over campus. For example:

— Botany Prof. Larry D. Nooden has obtained two patents for a mixture that can be misted on the leaves of soybean plants to prolong their lives and sometimes produce a richer harvest.

— Prof. John Patrick Hayes of Electrical Engineering and Computer Science has a patent pending for a self-testing computer chip to improve qual-



Dressman

Goldstein

ity control in semiconductor manufacturing plants. Conventional methods of testing computer chips use exterior electronic probes, but chips are becoming so complex and infinitesimal that such methods are becoming increasingly difficult to use.

— A patent is pending on a new enzyme capsule to improve the nutrition and health of cystic fibrosis patients, most of whom would be malnourished without dietary supplements of digestive enzymes. Pharmacy Profs. Jennifer B. Dressman and Gordon L. Amidon and other researchers have de-

veloped the design, and Amidon has formed TSRL Inc. to help market the capsule and other pharmaceutical technology.

— Profs. Steven A. Goldstein and Larry S. Matthews of the Medical School have three patents pending on the design of a new anchoring surface that is expected to make artificial joints more durable.

— Profs. Kensall D. Wise and David J. Anderson and graduate student research assistant Kenneth L. Drake, all of the College of Engineering, have filed an invention disclosure on the design of microelectronic probes that can be used to record the individual signals from clusters of nerve cells in the brain, giving scientists a chance to learn the code by which brain cells communicate with each other.

— A patent search is under way for Prof. Steven P. Levine of the School of Public Health, who has designed an air monitor to protect workers in computer chip factories from overexposure to arsine and other lethal gases used in the manufacturing process.

Under a formula set by the Regents in 1983, faculty and the University share in the profits of commercialization so as to encourage technology transfer and generate research funds for the University.

The inventor gets half of the first \$100,000 in royalties, the inventor's academic unit one-fourth and the University administration one-fourth.

The inventor gets 40 percent of the next \$100,000, and the unit and the administration get 30 percent each. Royalties above \$200,000 are divided with 20 percent to the inventor and 40 percent each to the unit and administration.

The University has also helped with faculty business startups by launching a spinoff company, Michigan Research Corp. (MRC), to help faculty inventors identify the commercial potential of their research and obtain the financial backing needed to launch their own businesses to market that research.

Midgley, who joined U-M in 1961, says the climate for spinoff businesses to market university research has become much more favorable over the years, reflecting "pressures in the academic community to relate what one does to the real world."

But at the same time, he and other scholars add, universities must guard against going too far in commercializing the products of faculty research. As Vice President for Research Linda S. Wilson put it in a recent issue of *Research News*: "Universities have grown up as critical seekers of truth. To the extent that they get deeply involved with government and industry, they may lose their ability or drive to be social critics."

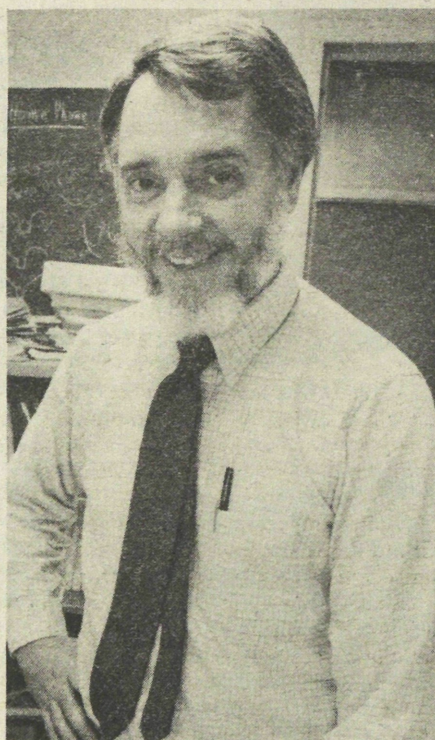
IN BACTERIAL PROTEINS '14' IS MYSTERIOUS NUMBER

By Frank Blanchard

A University microbiologist has discovered an unexpected pattern in the size of bacterial proteins, suggesting that they adhere to a previously unrecognized basic unit of structure.

Prof. Michael Savageau's finding was made possible by Prof. Frederick Neidhardt's extensive work toward the development of a catalog that eventually will list information about all of the nearly 3,000 proteins that can be produced by the bacterium *Escherichia coli* (described in "The Heat Shock Syndrome" in June's *Michigan Today*).

"It's something easy to describe and to see, and for that reason it has attracted attention and immediately suggests possible implications for protein



Savageau

structure and gene organization as well," Savageau said.

If further research confirms Savageau's observation, it could have a far-reaching impact on the ability of scientists to modify existing proteins or synthesize new ones. But scientists at the Massachusetts Institute of Technology who have reviewed Savageau's work caution against overstating its significance.

Savageau, drawing on information from Neidhardt's gene-protein catalog, examined about 1,000 of the 3,000 possible *E. coli* proteins and found that they tended to gather into groups that were multiples of 14,000 daltons (14 kDa), a measure of molecular mass.

Savageau told *Michigan Today* that his findings, which were reported in recent proceedings of the National Academy of Science, suggest that "the 14-kDa units exist for some fundamental geometrical or physical reason and then serve as 'frameworks' for the construction of essentially all functional proteins."

Originally, such a structural unit was suggested by several scientists between 1930 and 1940 on the basis of a small sample of proteins, but the theory was

strongly rebutted. The scientists, unable to substantiate their theory, abandoned it.

Savageau's access to a much larger sample of proteins revealed a somewhat different pattern that was distinct at 14, 28, 42 and 56 kDa, then became less evident as data at higher molecular masses became sparse.

Savageau said his research may provide scientists with a guideline for modifying or building proteins using genetic engineering techniques.

"If people are trying to construct a new protein that combines certain types of desirable functions, they might want the resulting protein to have a size within one of these units of 14 kDa," he continued. "If there is an odd size between one of these preferred sizes, perhaps there would be strong selective forces that would make the proteins unstable or not function as well."

Gregory Petsko of MIT told *Science* magazine, however, that it was too early to determine the significance of Savageau's findings and called for further investigation. When this matter is settled, *Michigan Today* will inform readers of the outcome.

KALAMAZOO'S BROWNS HEAD ALUMNI EFFORT

"When our son Fritz comes to campus this fall, he'll have the best in educational opportunities, because Michigan offers high-quality teaching in a diverse, stimulating environment," says Robert M. Brown, BSE '63, now a businessman in Kalamazoo, Michigan.

"That was true when my father came to school here in 1922," he continues, "and it was also true for me back in 1959. It's easy to understand, then, that maintaining excellence, which is what the Campaign is all about, has real and personal importance to me."

Bob Brown and his wife, Susan Crumpacker Brown, BA '63, an interior designer, have volunteered to serve as the national co-chairs for the Campaign for Michigan Fund, a special Campaign program that kicks off this month. The Campaign for Michigan Fund is the name given to the all-alumni solicitation phase of the overall Campaign.

The Fund's goal is to raise an additional \$20 million from alumni to help support the 17 schools and colleges at the University and the branch campuses at Dearborn and Flint. This \$20 million in expendable, unrestricted gifts will complement the \$160 million effort for facilities and endowment. Together, the two programs will help meet both current and future needs.

The Browns will lead the first-ever comprehensive solicitation of the entire alumni body. In their case, solicitation may begin at home, since at least 30 members of the alumni body are members of the Brown and Crumpacker families.

"For several generations our families have been drawn to Michigan like a magnet," Susan Brown says. "Our grandparents, parents, aunts, cousins, sisters, nieces and nephews have come here. I know how strongly loyal our families are, and I think that, like them, alumni everywhere are very proud of The University of Michigan. Through the Campaign we'll be offering the opportunity to turn that loyalty into tangible support for the University."

Many alumni will recognize the Brown family name, for Bob Brown and his father, Robert J. Brown, AB '26, have the distinction of being the first father-son football captains in Michigan history.

Robert J. Brown, who died in 1985, was a Regent Emeritus, a Michigan Benefactor and a volunteer in the \$55 M Campaign. The only previous major campaign in U-M history, the \$55 M Campaign, which was completed in 1967, raised more than \$70 million for The University of Michigan.

A fellow volunteer of Robert J. Brown in that Campaign was Owen W. Crumpacker, father of Susan Brown. Members of the Crumpacker family have been attending the U-M since the turn of the century. In fact, Susan's grandfather, Frederick Crumpacker, his brother Owen and their cousin Harry Crumpacker all received undergraduate degrees the same year — 1903. Susan's mother and three sisters also hold U-M degrees.

Like other alumni, their family members will be contacted personally on behalf of the Campaign sometime within the next two years. After receiving a letter from Honorary Campaign Chairman Gerald R. Ford, alumni will receive a second letter from the volunteer chairman representing the School or College from which they graduated. Then students working at the Campaign Phone Center will telephone each graduate to ask him or her to contribute to the Campaign via this special fund.

Alumni who are already donors will be asked to increase their annual support; others will be asked to make their first gift. In both cases, graduates will be asked to consider a three-year pledge.

Reaching the \$20 million goal set for



BOB AND SUSAN Brown will head the all-alumni solicitation phase of the Campaign. Their son Frederick (Fritz) Brown (right) will be a freshman at Michigan this fall.

the Fund will mean increasing annual support to \$10 million for each of two years as of July 1. All Campaign for Michigan Fund donors will be recognized as making both a Campaign for Michigan gift and a contribution to their own School or College's annual fund program.

Telephone calls to graduates of the College of Literature, Science, and the Arts will begin this month.

"If I could, I'd call each alumnus personally," says Bob Brown. "I love Michigan, and I like to think they couldn't say no when I asked them to join me in the Campaign."



STUDENTS will handle 50 phone lines six nights a week to reach the more than 250,000 U-M alumni and alumnae in the United States.

VOLUNTEERS SUCCESSFUL IN SPECIAL GIFTS PHASE

From Boston to Seattle, hundreds of dedicated volunteers in the special gifts phase of The Campaign for Michigan are continuing to help their university. Since they began last fall, their personal appeals to loyal U-M alumni across the country have raised nearly \$1.5 million in contributions toward the Campaign.

Under the leadership of national volunteer chairman and U-M Regent Thomas A. Roach, city campaigns designed to encourage gifts in the \$10,000 to \$100,000 range have been launched in Traverse City and Flint in Michigan and also in Cleveland, Boston, Fairfield County (Connecticut), Kansas City, Milwaukee and Seattle.

"The nearly 500 volunteers of the special gifts phase share an unbridled enthusiasm for the University," Roach says. "These men and women across the country are proud of their alma mater. They take great pride in its current achievements and really want to help maintain and enhance its continued excellence."

"One feeling that they all seem to share," Roach continues, "is a deep appreciation for the education that they received at Michigan. They readily accept the fact that they are probably asking prospective donors to commit the largest single charitable gift that they have ever made. But it is easy to sell something if you have pride in your product and confidence in its quality. And The University of Michigan is easy to sell."

Cleveland, the city that inaugurated the special gifts program, ran an inno-

novative program that was able to raise \$600,000 toward the Campaign, according to area Chairman Richard Katcher B.A. '41, J.D. '43 of Baker & Hostetler Law Firm.

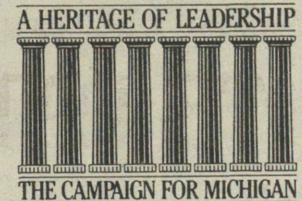
"Two nationally acclaimed law firms, ours and Squire, Sanders & Dempsey, pooled contributions from University law school alumni and raised \$150,000 each to be used for renovations in Hutchins Hall," Katcher notes. "We hope that other law firms in the country will do the same."

"The loyalty and love that alumni all over the country have for the U-M constantly amazes me," he says. "The 30 volunteers in Cleveland feel wonderful about our program."

This fall, additional campaigns will take shape in four other major metropolitan areas with high concentrations of U-M alumni: southeastern Michigan, western and southwestern Michigan, Chicago and New York City.

As Grand Rapids gears up for its special gifts portion of the Campaign, Chairman M. Dana Baldwin B.S.E. '62 speaks of the strength of that city's alumni:

"Both volunteers and alumni in the Grand Rapids area will go the extra distance and put forth the extra effort to see that excellence at The University of Michigan continues," Baldwin, president and chief executive officer of Olive Machinery Co., declares. "You just don't realize or appreciate the value of the whole, integrated Michigan experience until you move away and begin your life's pursuit."



BELLS ARE RINGING 7,000 TIMES A WEEK

Thousands of telephones in every corner of the United States will ring beginning this month when the U-M mounts its largest person-to-person fundraising campaign. The phonathon will mark the first time that the University will attempt to reach all of its alumni and alumnae in such a personal way.

Fifty phone lines will be in use six nights a week until all of the more than 250,000 alumni in the United States have been called. U-M students working at a special campus phone center will make calls to alumni, typically placing about 7,000 calls each week. The current students will ask former students to contribute to the Campaign for Michigan Fund, the separate \$20 million effort to meet current needs at the 17 schools and colleges at the University and the two branch campuses at Flint and Dearborn.

Phone center activity is being coordinated by the University's new Annual Programs Office, under the direction of Melanie Allewalt Kwan. "We expect that by talking directly with students on campus now, alumni will have a sense of the importance of this fundraising effort," Kwan said. "We hope that by the time the program is completed in July 1987, twice as many alumni will be donors to the University as before and that their support will continue on an annual basis."

CHRYSLER FUND AIDS ENGINEERING

The Chrysler Corporation Fund, a charitable agent for Chrysler Corporation, has made a \$1.25 million pledge to the University to support capital improvements for the U-M College of Engineering.

"We at the Chrysler Corporation feel that The University of Michigan and its various schools and academic programs are an outstanding asset for not only the state of Michigan but the world community," said C.J. Steffan, executive vice president of Chrysler.

"University of Michigan graduates are continuing to make important contributions to all aspects of Chrysler. We look forward to a strong, continuing relationship with the University, in terms of both attracting its graduates and utilizing its research facilities," Steffan added.

In announcing receipt of the gift, U-M President Harold T. Shapiro said, "We are delighted that the Chrysler Corporation's success has made a gift of this magnitude from its charitable fund possible. We are proud that The University of Michigan has been selected for the first major gift of this kind."

The Chrysler gift will enable the U-M's College of Engineering to complete an instructional complex that incorporates a fully integrated Computer Aided Engineering Network.

"The Chrysler Corporation's gift comes at a critical time for the College of Engineering," said Charles M. Vest, dean of engineering. "It provides a major boost to the final phases of development of our instructional complex and to the University's efforts to attract significant investments from private sources. This will support our efforts to respond creatively to the challenges facing American industry and engineering education during the 1980s and 1990s. We are pleased that the Chrysler Corporation has become an active partner with us in this venture."

FI mu
C479

Michigan Today



A CELESTIAL spirit carries garlands from heaven in praise of the Buddha. These fat dwarf-like creatures from India are emblems of auspiciousness akin to cupids and cherubs. (See 'The Caves of Ajanta' on Page 8.)

Michigan Today
The University of Michigan
News and Information Services
412 Maynard Street
Ann Arbor, Michigan 48109-1399

U-M Regents: Deane Baker, Ann Arbor; Paul W. Brown, Petoskey; Neal D. Nielsen, Brighton; Sarah Goddard Power, Ann Arbor; Thomas A. Roach, Detroit; Veronica Latta Smith, Grosse Ile; Nellie M. Varner, Detroit; James L. Waters, Muskegon; Harold T. Shapiro, President, *Ex-officio*.

The University of Michigan, as an Equal Opportunity/Affirmative Action employer, complies with applicable federal and state laws prohibiting discrimination, including Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973. It is the policy of The University of Michigan that no person, on the basis of race, sex, color, religion, national origin or ancestry, age, marital status, handicap, or Vietnam-era veteran era status, shall be discriminated against in employment, educational programs and activities, or admissions. Inquiries or complaints may be addressed to the University's Director of Affirmative Action, Title IX and Section 504 Compliance, 2012 Fleming Building, Ann Arbor, Michigan 48109. (313) 763-0235.

We are using mailing lists from several University of Michigan sources and are unable to combine them to remove duplications. If you receive an extra copy, please share it with a colleague or friend.