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The Gamut: A Journal of Ideas and Information, No. 29, Spring 1990

Cleveland State University

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Next issue, #30, will mark the end of our first decade of publication and the beginning of the second. There will be a party to celebrate the occasion and you are invited!

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Join us Saturday, June 16 for a gala celebration of the beginning of our second decade!

GAMUT



THE GAMUT

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THE COVER: It's a long way to the top: Sara Ruth Watson's account of the building of the Eiffel Tower begins on page 5. Photo courtesy of *The Cleveland Press* Collection, Cleveland State University Archives.

Editorial

Yes, We Need a New Pronoun or Something

By now everyone has noticed that it is no longer fashionable to utter sentences like "Everyone should clean off his desk before leaving." In some organizations, censors will edit the offending wording and conform it to appropriate norms. What we're talking about here is sexual bias in language, the built-in tendency, as old as the language, to consider the masculine the normal ("unmarked" as the linguists say) form and the feminine the "marked" or emphatic form. Somehow this trend has become associated with the political protection of minorities and women and is now a plank in the platform of feminist organizations.

The pressure for linguistic equality has had some strange results. The word *man* and the suffix *-man* in Old English meant "human being," becoming specialized to mean male human being only later. The distaste for this suffix by linguistic equal-righters has led to such forms as "chairperson" for "chairman," ultimately reduced to "chair," on further reflection, after the folly of revision produced such forms as "freshperson" and "postperson."

These attempts to revise the language, nearly always doomed by the irrefragable conservatism of speakers and writers, have been largely given up. The battle is now limited to personal pronouns, a field of endless size. Every time a writer starts a sentence that gives opportunity for an anaphoric use of a pronoun [like this one], **he** must decide whether to accede to the egalitarian tendency or (to put it differently) to protect himself from the objections of the female half of society, unless he simply states his preference, as Peter Gay does in his *Freud*:

For the sake of euphony, and to avoid clumsy locutions like "his/her" or, worse, "s/he," I have used the traditional masculine form to apply to both sexes.¹

Thus, there are only a few options available:

1. "Every time a writer . . . he or she . . ."
2. "Every time a writer . . . s/he . . ."
3. "Every time a writer . . . they . . ."
4. "Every time writers . . . they . . ."

At the moment, that's the available repertory. Some years ago, when the militant feminists began this movement, they offered a new common gender pronoun (*thon*, a Scots dialect term meaning "that one there"), but it did not take. Others have proposed the Latin neuter demonstrative *id*, but it is open to the objection that it propounds a radical innovation.

New words in profusion enter the language all the time, mostly nouns and some verbs, but not function words. Among such grammatical terms, only a very few prepositions have been accepted in the last few centuries. But no new personal pronoun has entered the language in the last five hundred years. The current personal pronouns (*I, me, my, you...*) were all in place by the end of the Middle English period (c. 1450). Apparently the language and its speakers are extremely cautious about tampering with the basis of our language, the 300 or so function words that make up more than half the words in any English text.

A new pronoun being out of the question, what to do? Obviously the choice lies among the options listed above. The first one has been discarded by everyone but politicians as clumsy and repetitious. The second, which has a certain economical elegance, is only nominally a solution: it is a

typographical construct and cannot be spoken: yet we do more speaking than writing. The third option is repugnant to any writer who is fussy about concord and even the desire to be just cannot overcome the feeling that justice does not require illiteracy. The fourth option is practical but limited. I am willing to use it, but there are occasions when the singular is absolutely essential. I leave out the bizarre solution promoted by some thinkers, to use the masculine and the feminine pronouns alternately, whenever a generic pronoun is required. Apart from the necessity this imposes on the writer to keep going back to see what was used last, it strains (at least for the current generation of readers) the attention and leaves us searching for this female that suddenly has invaded the foreground of the sentence. Ultimately readers might get used to it, but chaos would reign until then. It is too extreme a remedy.

Clearly a radical solution is required, something not tried before but so obviously right that all opposition and conservative obfuscation will fade. And I believe I have the answer.

The advantage of generic *he* has been its simplicity, clarity, directness, lack of ambiguity. No one really believed that the use of the masculine pronoun indicated a necessary masculine referent: it was simply history and politics that precluded its continued regular use. But if it is necessary to change and I acknowledge that it may be, the new solution ought to have some of the same advantages as the form it replaces: simplicity above all.

My solution is to adopt the neuter pronoun and make it into a common gender pronoun. But to insure that no confusion can take place, I would give it a new identity by the use of bold type (or italics or underlining). Thus the sentence cited above would in

its new (and complete) form look like this:
5. "Every writer differs in **its** style from everyone else's by virtue of the uniqueness of **its** idiolect."

Here **its** means either *her* or *his*. *It* and *its* are not the same as **it** and **its**. To the objection that this is merely another typographical solution, I answer that in speaking additional stress can be used to indicate to the listener that this is not ordinary *its* but common gender **its**, as some people sometimes now raise their voices or gesticulate to mark an inserted quotation.

An even more radical solution would be to jettison the gender system of English, which is based on the sex of the item referred to, the neuter pronoun being used for non-humans. Instead we would follow the arbitrary Bantu system which classifies things according to shape. Thus, for example, ships, shoes, bowls, glasses, beds, bags, suitcases, spoons, chairs and the like would be feminine gender. And umbrellas, candles, swords, flags, pencils (and word-processors, derived from pens), knives, towers would be masculine. In this welter of gender-marked objects, the gender of the pronoun would be

unnoticed and personal preference could assign gender to less clearly defined objects. Sentences like "I have lost my pen. Have you seen him?" and "The bed is unmade. Please make her up." would be in constant use with the result that no one would any longer be offended.

To feminist critics who imagine any animus against them and their linguistic revisionism in the above, I offer my unassailable credentials. I am well acquainted with a number of women, I am married to a woman, I have three daughters, and I was brought up by a woman, my mother. If more evidence were needed, I find the company of many men distasteful. My sympathy for women's causes is beyond question. When this matter first came up, I was perfectly willing to shift the generic burden to the feminine pronoun, but I was sure that women would argue that they had already suffered so many burdens, they did not need this additional one.

Louis F. Mbitia

¹ (New York: Norton, 1988, p. xxi).

Gustave Eiffel and His Tower¹

Sara Ruth Watson

Three builders of the nineteenth century made engineering history: Joseph Paxton, architect of the Crystal Palace for London's Great Exposition of 1851; John Roebling, designer of the Brooklyn Bridge (completed in 1883); and Gustave Eiffel, whose famous tower, completed in 1889, reached new heights. The Crystal Palace has been dismantled, but both the Brooklyn Bridge and the Eiffel Tower are still in use. Although Eiffel wanted his tower to be appreciated primarily for its aesthetic merit, he first had to convince people of its safety and practicality.

When he first proposed it, the tower was to be a symbol in the Exposition of 1889 of France's greatness in the economic world of its day. But from the inception of the project in 1885 until long after its completion, Eiffel had to fight for his creation. Its design, appearance, cost, and safety became issues of public debate. Many prominent Frenchmen opposed the erection of such a monument. Among the most vociferous were Alexander Dumas the Younger and Guy de Maupassant. They, along with other members of the intelligentsia, signed a manifesto protesting the idea of the tower, and the indignant poet Paul Verlaine swore that he would never again visit that part of Paris. Editors of newspapers also attacked it. *Le Figaro* went so far as to publish a special issue protesting the tower, and several property owners in the district instituted suits against Eiffel, stoutly insisting that the courts prohibit "the construction of so dangerous a structure." Prudently, most of Eiffel's engineering colleagues refused to comment. After it had been built, Maupassant often took lunch in its restaurant even though he didn't like the food, because, he said, it was the only place in Paris where he didn't have to look at it.²

In addition to fighting the laymen, Eiffel had, throughout construction, to contend with technological lags in the industry—inadequate supplies, untrained workmen, skeptical manufacturers. It took a man of great character as well as



Sara Ruth Watson, who has always lived in the Cleveland area, received her A.B., M.A., and Ph.D. from Case Western Reserve University. She is a professor emerita of Cleveland State University. "My father was an eminent civil engineer and I helped him write and lecture. Together we wrote a book, Bridges in History and Legend. In 1940 I offered what was then a pioneer course in the 'History of Civil Engineering,' and I taught the course, in addition to my English classes, at Fenn College and Cleveland State University."

technical genius—one who well deserved the appellation "Father of Metal Construction in France"—to overcome the obstacles in his path.

Eiffel—his full name was Alexandre Gustave Boenickhausen-Eiffel—was the great-grandson of a German immigrant. He was born (1832) in Dijon, where his father had settled after fighting under Napoleon. In his memoirs, written when he was ninety, Eiffel describes a normal, happy boyhood, recalling that he learned good republican principles from his uncle Jean-Baptiste Mollerat, a chemist who had invented a method for distilling acetic acid from wood. Uncle Jean-Baptiste enjoyed a certain amount of local fame for having witnessed the death of Robespierre at the guillotine. He often proclaimed that all kings were rascals, punctuating his remarks with a sharp look at the young Gustave through his pince-nez.³

Gustave was not an eager student until his last years at the Lycée Royal, when two professors aroused in him an interest in literature and history. "He managed the difficult achievement of passing a double Baccalaureate in literature and science, and was sent to the elite Collège Sainte-Barbe in Paris to prep[are] for the Ecole Polytechnique."⁴ The excitement of Paris was a great stimulus to the young man, who found time, in spite of the strict regime of Sainte-Barbe, to learn to dance and to meet English girls. "They [English girls] are lots of fun," he wrote home, "much less reserved than French girls."⁵

Because of a mistake he made on the final examination, he failed, in the summer of 1852, to make the Polytechnique—a prestigious school responsible in large part for France's supremacy in mathematics and science during the nineteenth century. But Gustave, undismayed, went to the Ecole Centrale des Arts et Manufactures. Here he chose chemistry for his major field of study, intending upon graduation to enter his uncle's firm. But just before he received his degree in 1855 his uncle and the Eiffels had a violent political dispute and were no longer on speaking terms. So Gustave looked for a job in Paris.

He went to work for Charles Nepveu, head of a firm that fabricated steam engines, rolling stock, and other railway equipment. Gustave took a job as Nepveu's personal secretary, but the firm soon went bankrupt. Both Nepveu and his young protégé managed to find employment with a Belgian railway equipment firm, Nepveu becoming director of the Paris office, Eiffel head of research.

This move put Eiffel into the most important and fastest growing industry, for the railroad was the focal point of the Industrial Revolution. In 1871 France discovered that it possessed the largest iron ore vein in Europe on its side of the border of Lorraine—about one-fifth of the world's supply. French



Eiffel first won fame as a builder of bridges. At left: his monumental viaduct over the Truyère River at Garabit in the Massif Central of France—400 feet high, the highest in the world when it was built.

railway engineering was at its height: from 1852 to 1857 nearly eight thousand miles of track were laid and six more firms sprang up. Eiffel wisely abandoned chemistry for civil engineering.

His first major contract was commissioned by two railway lines: the Compagnie d'Orleans and the Compagnie du Midi. In 1858 they decided to connect their networks with a bridge across the Garonne River at Bordeaux. Eiffel was instructed to oversee the entire operation and to complete it by June 1860.

To build a 1600-foot cast-iron railway bridge on six piers across a turbulent river in two years, Eiffel boldly decided to employ a new method of pile-driving using hydraulic presses and compressed air. With the opening of the bridge, on time, Eiffel immediately established himself as an inventive engineer of a new kind. In building this bridge, he set a pattern of work which he followed for the rest of his life: "textbook execution of a carefully conceived, theoretically sound plan that freed him from the trial-and-error methods still prevalent in most engineering of the time."⁶ One incident almost marred his careful plan: a riveter fell into the river and was caught up in the current; but Eiffel, a strong swimmer, plunged in and rescued the man. When the bridge was opened, the workmen presented its builder with a model of the structure and of the hydraulic pile-driver.

At the beginning of 1862, he decided to marry. He looked for a young and pretty woman with a good dowry. But four successive proposals failed. So he wrote to his mother: "I'm getting old, I'm over thirty and I have no desire to live the life of an old bachelor....I would be satisfied with a small dowry and a plain face in exchange for a good nature, an equable temperament and simple tastes. To be precise, I need a good housekeeper, who will not make me impatient, who will

deceive me as little as possible and who will bear me fine healthy children that I know are my own." His mother shortly offered him Marie Gaudalet, barely seventeen, whom he married.⁷ At Dijon Eiffel had known Marie Gaudalet since childhood. In 1862 they set up housekeeping in an apartment in Paris. They had five children before Marie died after fifteen years of marriage. Eiffel never married again. But he kept his eldest daughter Claire with him even after she married.⁸

By 1867 Eiffel had opened his own shop in an industrial suburb near Paris. This, the Societé d'Eiffel et C^{ie}, pioneered in the manufacture of steel, fabricating metal work for everything from bridges to railroad stations to factories. In 1867 Eiffel was awarded the contract to design the iron-arch girders of a building in the Paris Exposition of that year. At the time Eiffel's structure was the world's largest iron-frame ellipse—1608 feet by 1266, with arches 82 feet high.

In many ways—by the extensive use of new materials, by the employment of new equipment (such as elevators), by the provision of walks along the transparent glass surfaces of the promenade—this building introduced the public not only to advanced technological changes but to a new aesthetic.

In designing the girder arches Eiffel experimented until he evolved a formula workable for all wrought-iron construction. His published memorandum on the subject took much of the guesswork out of calculating the effects of stress and strain upon members of a given iron structure. His formula became one of the most valued tools in creating the sturdy but light structures that mark his work; he could reduce trusswork without sacrificing strength and rigidity. Thus Eiffel became a precursor of what Lewis Mumford called "the architecture of the future, light, aerial, open to sunlight, an architecture of voids rather than solids."⁹ Using wrought iron instead of cast iron, he was able to make his bridges lacy structures nearly invulnerable to wind pressure. Previously, bridge failures had enormously increased as spans became longer and railway trains heavier.

Meanwhile Eiffel's firm was being asked with increasing regularity to bid on big jobs, particularly railway bridges, for which the sudden expansion of the railroads had created a great demand.

Eiffel became Europe's premier bridge builder, completing over fifty such structures, many of them employing remarkable new engineering techniques. Among the more spectacular were the wrought-iron arch bridge 262 feet above the Sioule River north of Clermont-Ferrand in France's Massif Central; a 525-foot span across the Douro River at Oporto, Portugal; and the monumental Garabit viaduct over the Truyère River, 1850 feet long and 400 feet high—the highest in the world—resting on five trusswork piers and requiring 3587 tons of wrought iron. Eiffel pioneered in using a cantilever method

in erecting the spans, and he depended, to a degree unheard of before him, on rigorous calculations to allow for the effects of winds, temperature changes, and deflections due to heavy loads.

Meanwhile Eiffel's firm built the vast, ornate railway station in Pest, Hungary, in a metal-and-masonry style that today would be called art nouveau; the trusswork and 110-ton dome for the Charles Garnier observatory at Nice, which he set on a floating ring so that it could be rotated by hand; and prefabricated campaign bridges used by the French army and soon adopted by armies of other countries.

Eiffel contributed to another world-famous monument, though his name is seldom connected with it. "Liberty lighting the World" was the brainchild of an Americanophile professor of law, Edouard de Laboulaye. The work itself was the creation of the sculptor Frederic Auguste Bartholdi. But after the original design of Viollet-le-Duc, medievalist and restorer of Notre-Dame, proved inadequate, Eiffel was asked to devise the substructure.¹⁰ The colossus was intended to symbolize Franco-American friendship, to celebrate the U.S. centennial, and to promote republican ideas. It was to be 151 feet tall, the greatest statue ever made; its head is 17 feet from chin to cranium, its index finger eight feet long, and an extended right arm 42 feet long and 12 feet thick. In 1881 Eiffel designed the iron framework—a skeleton frame resting on vertical steel beams placed on a granite pedestal. The most difficult problem was designing the torch-bearing arm; Eiffel ran the arm's supporting beams on through the body and over to the left side, to counterbalance the overhang.

By the spring of 1883 the skeleton was standing in the workyards of Gaget, Gauthier et C^{ie} in Paris. For over a year the statue grew behind the wooden scaffolding. The French navy transported the statue across the Atlantic, after it had been officially presented to the United States in a ceremony in Paris on July 4, 1884. Its metal components were dismantled, labeled, and packed into 85 wooden crates, and stowed aboard a three-masted schooner, which sailed from Rouen to New York.

In these years Eiffel was, as Joseph Harriss wrote:

an engineer living in the glorious times of his profession,...at the peak of his career. Contemporary photographs show him at age 55 to have been small but well-proportioned, with large, thickish hands, close-cropped graying beard and hair, and heavy-lidded light blue eyes. If anything was remarkable about his generally unexceptional appearance, it was his serene, hooded gaze which gave him a look of self-possession, free of interior conflict of any sort; dull company perhaps, but one would feel safe crossing one of his bridges."¹¹

Eiffel always published the blueprints and calculations of his projects once they were completed. As an engineer, he scorned superfluous ornamentation and was often heard to



Eiffel's skeleton for the Statue of Liberty.

Gustave Eiffel (about 1900). Photo courtesy of The Cleveland Press Collection, Cleveland State University Archives.



mutter, "stupid as an architect" when confronted with a bad design. But now his greatest moment had arrived.

A great exposition was planned for the centenary of the French Revolution in 1889. A tower of colossal size seemed to the planners to be the appropriate centerpiece. Monumental towers had often been proposed during the nineteenth century. The Washington Monument (169 meters), proposed in 1848, was finished only in 1885 after much trouble with its tendency to lean. In that year, Louis Bourdais designed a 300-meter lighthouse in the form of a hollow column resting on a stone cube. The *Tour-Soleil* (Sun-Tower) was to rest on the ground (without foundations) and be topped by a capital containing a furnace. The Sun-Tower was not taken seriously: Eiffel demonstrated that a 300-meter tower made of stone could not remain standing. Eiffel's chief of research and an associate named Nouguié proposed a 300-meter tower made of steel resting on deep foundations. This proposal was found attractive by the Exposition Committee because it would demonstrate to the world France's pre-eminence in metal construction.¹²

The tower was the dramatic structure of Eiffel's life; it was not only his greatest metal construction, it was also his last. Its site, the Champ de Mars, has been the location of several other Paris Expositions in 1867, 1878, 1900, and 1937. The sub-soil of the Champ de Mars consists of gray clay about fifty feet deep resting on a solid foundation of chalk. Its proximity to the Seine, however, has overlaid this with twenty feet of sand and gravel which slopes towards the river. In early January of 1887 Eiffel received initial results of bore samplings. These threatened to be the first problem in building the tower. Eiffel made more thorough tests, using cylindrical pneumatic caissons seven feet in diameter. He dug to a depth of 48 feet. Workmen turned up layers of sandy clay and fine sand above the compact gravel, which could support foundations. If he sank the foundations for the piers on the Seine side 16 feet deeper than on the other two he would be safe.

Work began simultaneously on all four piers. On March 26, his workshops started building 16 iron caissons, four for each pier. Each caisson was 50 feet long, 20 feet wide, and 10 feet deep, with a working chamber six feet high. The men entered from the top through an air-lock, and the air pressure was kept high enough to keep out below-surface water. The walls of the caissons were wedge-shaped at the bottom to facilitate their sinking as work proceeded. The workers were lighted with electricity—something of a novelty at that time. Work proceeded rapidly, and no cases of the bends were reported.

Each pier was to rest on a massive pile of cement, and these foundations went obliquely into the earth so that the curving columns that bore the weight of the tower would exert their thrust at right angles to the mass. In each excava-

tion a bed of quick-setting concrete 29 feet deep was poured. Over the cement Eiffel placed huge blocks of limestone. These blocks were capped by two layers of ultra-hard cut stone from Chateau Landon, the quarry that had provided stone for the Arc de Triomphe. Embedded in the center of each mass were two great anchor bolts 26 feet long and four inches in diameter, to which a cylindrical flanged iron shoe was attached. The columns were bolted to the shoe and then locked into the solid mass. Pressure from the columns is 104 lbs. per square inch—one percent of the available strength. The anchor bolts were actually not necessary but were useful for assembling the leg structures.

Eiffel's characteristic ingenuity is displayed in the design of the cylindrical shoes that receive the columns. In the hollow of each shoe Eiffel placed a piston that could be moved by water under pressure. These hydraulic jacks enabled him to raise or lower each of the sixteen columns to be sure that the piers were in exact horizontal position when it came time to join them with a band of girders at the first platform. With the jacks, each capable of lifting 900 tons, Eiffel was able to fine-tune the ungainly iron piers into perfect alignment.¹³

One of the most remarkable features of the tower was its light weight. Eiffel reduced the amount of metalwork to an absolute minimum consistent with maximum safety; there was no superfluous trussing. Before the first girder had been raised, Eiffel could calculate the tower's exact weight, and guarantee that the combined forces of gravity and wind could not cause any unpredictable stress.

After Maurice Koechlin and Emile Nouguier had first proposed the tower in 1884, Eiffel had his draftsmen quickly turn out blueprints of every piece of metal to be used: 5329 mechanical drawings representing 18,038 separate items. These drawings took the draftsmen 18 months to make. The greatest difficulty was the tower's odd angles; the curved, weight-bearing edges describe irregular arcs, varying gradually from top to bottom. Each panel required an individual design, and all calculations were accurate with a tolerance of one-tenth of a millimeter. The tower was designed to accommodate over 10,000 people, with a combined weight of about one and a half million pounds.

The central problem was the wind. Eiffel figured a wind of 134 mph over the entire surface; then he recalculated, figuring a wind of 148 mph at the top, diminishing gradually to 105 mph at the bottom, even though Paris had never undergone such a wind. Eiffel conquered the wind by reducing the supporting elements in an openwork structure until the wind had virtually nothing to seize upon. In other words the real strength of the tower lay in its voids, its open spaces, as well as in its iron.¹⁴

During July, 1887, the four legs of the tower gradually rose, leaning toward the center at an angle of 54 degrees and



January 7, 1888



April 27, 1888



July 19, 1888



September 19, 1888

toward each other. Finished iron pieces arrived regularly every day from the shops. The girders, smaller than had been the practice, were hoisted into place by steam-powered cranes. Eiffel had learned that using small components was faster and safer even if it required more riveting, and cranes could be smaller and movable.

The workmen erected the lower pieces with assembly-line speed. First they placed temporary pins in the joints, replacing them with bolts and finally with rivets. The crew was comparatively small, no more than 250 on the site at any time.

As the columns rose, the moment grew nearer when their inclination would topple them, unless they were given support. This would begin to happen (when their centers of gravity were located beyond their bases) at a height of 92 feet, but the columns would not be joined until they reached the first platform at 180 feet. For temporary bracing twelve wooden pylons 90 feet tall were built and placed beneath the three interior columns of each pier. These were the first of two major scaffoldings required during the building of the tower. They were joined to form a square frame that would bear the increasing inward pressure of the piers as they rose above the 90-foot pylons; the frame also supported the heavy iron girders and trusswork when they were raised to unite the piers permanently. Eiffel's second system to be used in adjusting the angle of the piers was simple: sand-filled metal cylinders resting on the platforms and attached to the columns were accompanied by another set of jacks. The cylinders had pistons at the top and plugs at the bottom. The columns leaned against the piston. If the column was found to be too high, the plug could be pulled and the sand allowed to run out; if the column was too low, the jack could be operated to push the column back into place. On October 10 the truncated piers reached 92 feet and began to lean against the wooden pylons.

Shaken by fear that the metal tower might collapse and destroy nearby houses, including his own, an alderman whose house was located near the Seine sued the city of Paris to stop construction. The city fathers had faith in Eiffel—but they refused to accept responsibility for accidents and damage to persons or property. To Eiffel, keeping to his construction schedule was indispensable. To avoid the lengthy delays of the legal process, he accepted financial responsibility in case of a disaster and agreed to remove the wreck in case of collapse.¹⁵

February 2, 1889: the tower nears completion.



There were twenty riveting teams that drove an average of 1600 rivets each working day. The quadrangular pieces had now reached a height of 180 feet. At this point they were joined by an iron belt of horizontal trussing that united the piers. The trussing, which was 25 feet deep, would form the top of the pedestal with the piers as legs. On this the rest of the tower would sit. The trussing had to be rigid enough to unite the leaning piers into a solid base and also be perfectly horizontal. The question was whether the sixteen columns of the four piers would meet the belt at precisely the right height and at the spot where the rivets had been bored. During their rise the position of the piers had to be checked frequently.

In early December when the piers were completed, the girders of the trusswork were raised to the top of the four 150-foot platforms and riveted together. Then came the delicate process of joining the mass to the piers.

This was the move Eiffel had foreseen when he had the hydraulic jacks installed. During erection he had kept the columns slightly closer to the vertical than the final angle would be so that last-minute corrections could be made by lowering, not raising, the heavy beams. Slowly he brought the sixteen columns into line. When each column reached the proper height and angle, iron wedges were driven beneath each column to fix it in place. On March 26, 1888, the operation was completed, without any need to correct the alignment of the rivet holes.

The completion of the first platform gave Eiffel a launching place for the rest of the tower. On this platform he set up a steam-powered crane to lift materials from the ground. Tracks were laid around the platform and wagons carried materials to the creeper cranes. Eiffel placed a canteen on each platform for the workmen in order to save time during lunch breaks and to prevent accidents by keeping the workers away from drink during work.

From the foundations to the second platform the tower is made of four quadrangular piers joined into a rigid whole by horizontal bands of girders beneath each platform. But from the second platform to the top the four piers converge at a point slightly above the second platform into a single vertical column. There the four creeper cranes could no longer follow the tower's rise, so Eiffel put two new cranes on the vertical beams rising from the center of the tower. Later these would guide elevators to the third platform. To give these cranes sufficient support, auxiliary iron frames 30 feet high and two feet wide were bolted to the column and the cranes attached to them. As the tower rose the process was repeated.

As late as the first months of 1889 visitors still had to climb stairs and ladders, for the elevators were not yet functioning. The inclined angles of the lower columns created a problem for ordinary elevators. The staircases went from the



The Eiffel Tower a century later. Photo courtesy of The Cleveland Press Collection, Cleveland State University Archives.



Stairway up the tower. Photo courtesy of The Cleveland Press Collection, Cleveland State University Archives.

ground to the first platform and from the first to the second. Only workmen were allowed to use the narrow spiral staircase which went to the top. The west staircase (up only) could take about 2000 people per hour. Four sets of elevators were provided: one each in the east and west legs (made by the French firm of Roux, Combaluzier and Lepape) from the ground to the first platform; an Otis elevator from the ground to the second platform, in the north leg; another Otis elevator from the first to the second platform, in the south leg; an Edoux (French) elevator from the second to the third platform. The construction of the lower elevators was made difficult by the inclination of the legs between 54° and 80° . The elevator cars from ground to first platform each consist of two compartments, one on top of the other, which together can carry one hundred passengers, thirty of them seated. Only ten one-minute trips per hour were possible because the return journey of the cars was slow. The hydraulic Otis elevator in the north leg, also two compartments high, holds only forty people, all seated because of the change of inclination between

the two platforms. The Edoux elevator is really two separate cars each covering half the distance from the second platform to the top. Passengers change cars on a landing at 700 feet. Each car serves as a counterweight to the other: when passengers board the lower one, the higher one is at the third platform. As the lower one ascends, the other descends until they meet at the landing and the process is reversed. Eiffel was very proud of his safe and efficient solution of the elevator problem.¹⁶

Most observers fail to realize that the magnificent circular arches between the legs of the tower bear no load at all. They are purely decorative—and perhaps psychologically significant, for Eiffel believed that the public would understand a structure supported by arches familiar from church architecture but would feel less secure with one resting only on curving pylons.

A restaurant was built on the first platform, on the second were a printing press and editorial rooms for *Le Figaro*, and on the third, rooms for Eiffel. On the first level Eiffel placed portraits of seventy famous scientists.

The tower was given a coat of reddish brown paint called Barbados Bronze. A deep brown at the bottom, the colors gradually lightened to almost a yellow at the top.

By the end of March the tower was completed, two and a half months ahead of schedule. The tower was the tallest man-made structure in the world (984 ft.) until the Chrysler Build-



View from the top. Photo courtesy of The Cleveland Press Collection, Cleveland State University Archives.

ing in New York (1929). Eiffel's precise work habits and clock-work precision had enabled him not only to meet his deadline but to build a monumental structure with only one fatal accident.

On Sunday, March 31, Eiffel with a few dignitaries and colleagues reached the top, unfurled a flag, and fired a 21-gun salute. The tower was officially finished. On May 6 came a public opening, with appropriate ceremonies. Ticket receipts enabled Eiffel to pay off bondholders within the first year of the Exposition, and the tower has been making money ever since.

Eiffel wanted his tower to be appreciated for its beauty, its aesthetic appeal. But he had to wait until after the turn of the century before artists began to realize its importance to French culture. The poet Guillaume Apollinaire called it "the shepherdess of the clouds": "O shepherdess, O Eiffel Tower, your flock of bridges is bleating this morning." And poet Leon-Paul Fargue called it "the i of Paris firing its dot like a glorious cannon towards the beauty of the stellar spaces." Jean Giraudoux expressed his feelings about it in a poem, "My Bien...My Pretty Eiffel Tower."

Jean Cocteau wrote a play about a wedding that took place in the tower, *Les Mariés de la Tour Eiffel*, and there were popular songs written about it. During the war Mistinguett cheered Paris by singing, "The Eiffel Tower is still there." And Maurice Chevalier popularized another song: "What vertigo it gives you! Paris so grandiose doesn't look like much from 300 miles up!" Films also were made there, including *The Lavender Hill Mob* and Rene Clair's classic *Paris qui dort*.

André Malraux declared it to be an historic monument, and Roland Barthes wrote, "The surprising thing is that Paris waited so long to acquire its symbol. The Eiffel Tower became Paris through metonymy."¹⁷

But the graphic artists have perhaps done the best job of displaying the tower's beauty. In 1889 Seurat did a magnificent pointillist painting of it; Louis Hayet, protégé of Pissarro, saw it as a counterpoint to the obelisk at the Place de la Concorde. Pissarro, Chagall, Gromaire, Dufy, Henri Rousseau, Picasso, Utrillo, and Van Dongen—all used the tower as the subject of paintings and drawings. And Robert Delaunay, a cubist, did fifty-one canvases of the tower before achieving the results he wanted. Less well-known artists and innumerable photographers have recorded, distorted, mythified and made an icon of the tower, linking it permanently with the City of Light.¹⁸

Gustave Eiffel lived until 1923, and his active mind continued to seek new challenges. He became deeply involved in the building of the Suez Canal and in meteorological experiments. But he will always be remembered, before all else, for his great tower, one of the wonders of the modern world. ■



Above: Jean Cocteau, *The Eiffel Tower* (1939). Collection Romi.

Below: Robert Delaunay, *The Eiffel Tower* (1926). Museum of Modern Art of the City of Paris.



Notes

¹This paper is much indebted to Joseph Harriss, *The Tallest Tower* (Boston: Houghton Mifflin, 1975).

²Roland Barthes, *The Eiffel Tower* (New York: Hill and Wang, 1979), p. 3.

³Harriss, p. 33.

⁴Ibid.

⁵Ibid.

⁶Harriss, p. 36.

⁷Bertrand Lemoine, *Gustave Eiffel* (Paris: Hazan, 1986), tr. by ed.

⁸Henri Loyrette, *Gustave Eiffel* (New York: Rizzoli, 1985), pp. 36, 76.

⁹Cited by Harriss, p. 40.

¹⁰Lemoine, pp. 74-6.

¹¹p. 52.

¹²Loyrette, pp. 105-111.

¹³Harriss, pp. 58-60.

¹⁴Harriss, pp. 61-3.

¹⁵Lemoine, p. 96.

¹⁶Loyrette, pp. 149-150.

¹⁷Cited by Harriss, p. 215.

¹⁸See *La Tour Eiffel des artistes* (booklet sold at the Tower, containing 58 pages of pictures of the Tower).



Fernand Leger (1881-1955), "Project for the Illuminated Decoration of the Eiffel Tower," Collection Romi.

Tumors of the Mind

Robert J. White

What did George Gershwin the composer, William Casey the C.I.A. director, and Sir Dudley Pound, World War II first Sea Lord of the British Admiralty, all have in common? They all died from malignant brain tumors.

Unfortunately, there is probably nothing more frightening in the way of a medical diagnosis than to be told by your physician that you have a tumor of the brain. We not only immediately associate it with the possibility of impending death, but with the equally disturbing thought that it will destroy our minds as well. This tragic scenario, which has become part of our memory, reinforced through literature and folklore, is still with us.

Who can forget John Gunther's moving and poignant book entitled *Death Be Not Proud*, which set forth the tragic story of his son's fight against a cancerous lesion of the brain? Even today one finds among the medical profession, as well as the public, considerable confusion and outright ignorance as to what a brain tumor is, how it should be treated, and what the potential for survival is for a patient suffering from such a malady.

Picture a highly successful psychiatrist, who must handle his own emotions following surgery that has established a diagnosis of a malignant tumor of the brain, noting each day in his diary subtle changes that he recognizes in his thinking process, realizing that someday soon the entries will be inappropriate and then finally stop.

It is well to remember that such unique mental activities as memory, intelligence, emotion, speech, and decision making, as well as the entire cognitive process exist anatomically and function only within the cellular matrix of the human brain. Thus, when a group of cells undergoes an abnormal and excessive growth, leading to the formation of a cerebral tumor, the delicate circuitry that forms the basic cellular structure for these extremely complex brain processes is destroyed. Consequently, with this tissue destruction,



"For thirty years, it has been my responsibility to operate on the human brain and attempt, through operative and pharmacological techniques, to correct diseases of the brain." Aside from developing advanced surgical techniques involving low temperature phenomena, Dr. Robert J. White has published nearly 500 articles, and has been successful in establishing, for the first time, a Papal bioethical committee.

appropriately located neurological and psychological capabilities become compromised and eventually fail completely.

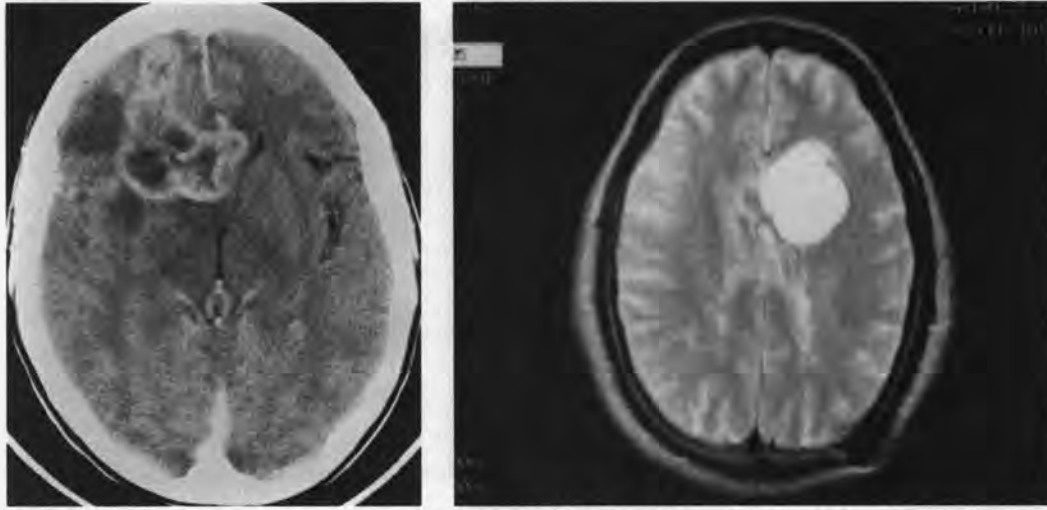
The most frequent tumors of the brain actually arise from the intrinsic cells that compose the tissues of this vital organ. Fascinatingly, such expanding lesions rarely develop from the primary cell of the brain, the neuron. Rather, the majority of such lesions, many of them highly malignant, develop from the supporting cells, such as the astrocyte, which provides nutrition and insulation for the neuron. In the cases of George Gershwin, the British Admiral, and John Gunther's son, their tumors arose from this supporting cell.

Another important group of intracranial growths originates from the membranes that surround and invest the brain, the so-called dura, and are located within the confines of the skull. Such lesions, fortunately non-malignant, can be removed with little or no damage to the patient's neurological capabilities.

Even today classification of primary tumors of the brain remains difficult. Furthermore, recent advances in medical and surgical oncology, which have resulted in significant increases in survival of patients suffering from cancers in other organs of the body, have created a marked increase in the number of tumors of the brain that represent spread from cancerous involvement of these regions of the body (the best examples of which are lung and breast). The tumors generally do not pose major difficulties in diagnosis, if the original organ involved with the malignancy is known. In recent years, even the surface tissue of the body has contributed to brain tumors, specifically from a skin cancer known as melanoma.

Brain tumors in general announce their presence by causing increased pressure within the skull and on or in brain tissue itself, often producing swelling in the brain substance next to the developing tumor, which is expanding in size itself. While other malignancies often travel or metastasize through the body by way of the blood stream or even direct extensions, highly malignant primary brain tumors seldom metastasize outside the fluid pathways of the skull and spinal column. Unfortunately, brain tumors as a group are not rare in children and represent the second most frequent solid tumor in pediatric patients.

Until relatively recently, the physician had to rely on a very careful analysis of the patient's medical history and detailed examination of the patient's nervous system to determine the presence or absence of a growing mass within the skull affecting the brain. If such an analysis suggested the possibility of an intracranial tumor, invasive and often dangerous X-ray studies had to be employed to substantiate the possibility of such a pernicious lesion. These usually involved the



Left: a CT scan of a highly malignant tumor in the forward portion of the brain involving both frontal lobes. The tumor is represented by the serpentine white markings that actually display some of the circulation within the tumor. Right: a reproduction of the newest imaging technology, the MRI. The large white globe is actually a benign brain tumor, which can be totally removed in this patient.

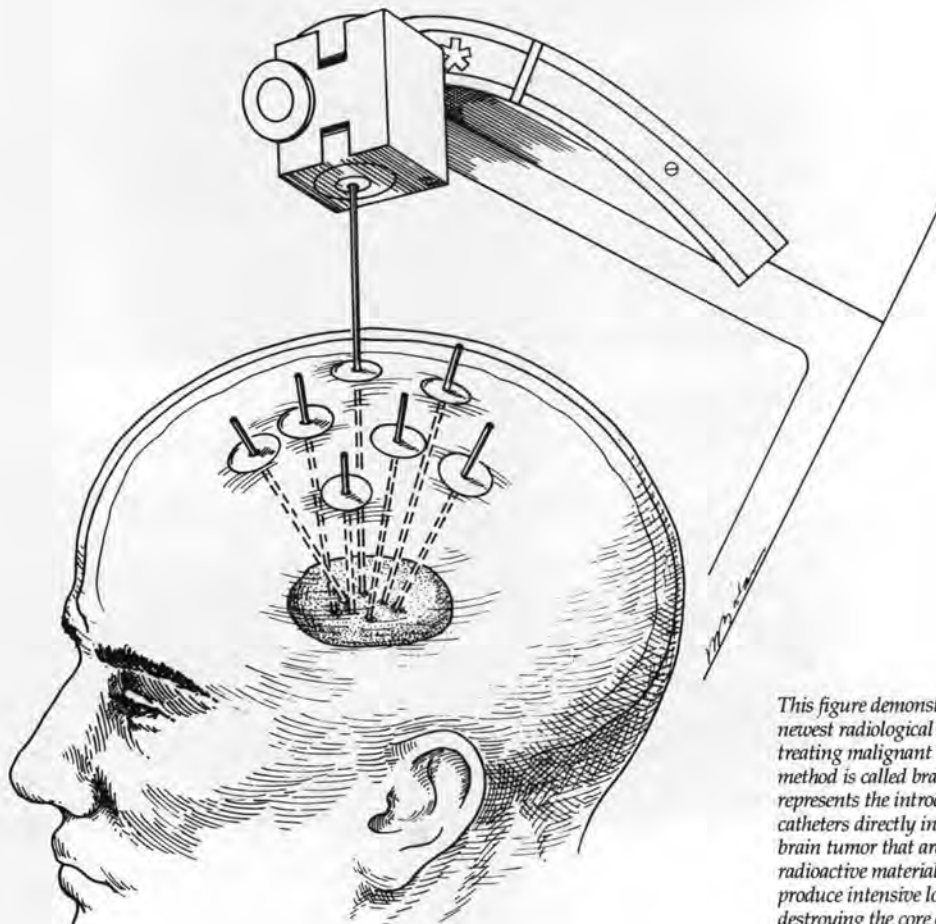
direct introduction of air into the fluid pathways of the brain (pneumoencephalogram) or introducing a specialized dye containing iodine (easily seen with X-rays) into the blood stream so that the intimate blood vessel circulation of the brain could be visualized (cerebral arteriography). Nowadays, the radiological diagnosing of brain lesions has been revolutionized through the use of new and sophisticated imaging technology, such as CT scanners and magnetic resonance imaging (MRI) units.

The abbreviation CT represents a further shortening of the initials C.A.T. which stands for Computerized Axial Tomography. This technique represents a rapid computerized (mathematical) reconstruction in an anatomical cross section of the head, utilizing multiple X-ray projections in a circular array. These X-ray cross-sectional reconstructions are repeated until the entire head has been scanned (similar to dividing an apple into consecutive, thin slices). These individual slices are individually printed on conventional X-ray film for interpretation.

Magnetic resonance imaging (MRI) or nuclear magnetic resonance (NMR) does not require exposure to standard X-ray radiation as is required with CT. This advanced technology requires the positioning of the patient's head in a large magnet (similar to what is required for CT imaging where placement occurs in a highly specialized X-ray unit)—sort of placing the head in the hole of a gigantic doughnut. While the head is in this powerful magnet, the tissues down to their anatomic nuclei are subjected to strong electromagnetic radiation. This energy is absorbed differently by some of the particles, for ex-

ample, hydrogen nuclei, which, in turn, will emit radio frequency signals of their own. These, then, can be detected with appropriate monitoring devices. Utilizing special coding and sophisticated computer treatment, high resolution tomographic images are created, very similar to, but much more anatomical and elegant than the imagery generated with CT. Thus, it is possible today not only to locate within the brain the position of the lesion, but it is often possible to characterize it in terms of its pathology as well. As a consequence of these spectacular advances in actually seeing into the brain of the living person, surgery can be undertaken much earlier and can be designed in a much more scientific way for the patient.

Along with the great advances for diagnosing such tumors, there has also been significant improvement in the operative techniques utilized in treating brain tumors. Whether the tumor is benign or malignant, special operating microscopes provide superb illumination and magnification for their removal. These instruments recently designed and adapted for human surgery are direct descendants of the regular dissecting microscope used in the high-school or



This figure demonstrates one of the newest radiological techniques in treating malignant brain tumors. The method is called brachytherapy and represents the introduction of special catheters directly into the brain and the brain tumor that are loaded with radioactive materials which will produce intensive local radiation, thus destroying the core of the tumor.



college biology laboratory. With their use the surgeon has a superb view of the tumor, its blood supply, and its relationship to contiguous brain structures themselves. They all provide safer and better surgery.

Literally, all intracranial lesions, no matter where they are located in the delicate mosaic of the brain, can be approached and, if not totally resected, can be reduced in size with a great deal of safety. Thus modern-day brain surgery can now offer to many patients with nonmalignant lesions complete cures with a return to normal life. In the case of highly malignant tumors, surgery combined with special forms of radiation and chemotherapy can significantly extend the lives of patients while also improving the quality of their lives.

Brain tumors are really lesions of the human mind. Although the psychiatrist will soon give up writing in his diary as his malignancy spreads, the cure of even such a dreadul lesion as his will someday come about through modern research and technology. ■

The author utilizing the operating microscope during a tumor removal. The cellophane covering the microscope maintains sterile conditions in and around the surgical field.

Paradise—a Nice Place to Visit

Ray Begovich

Palm trees. Cockroaches. Topless beaches. Dead dogs. Blue lagoons. Traffic jams.

Paradise. Tahiti.

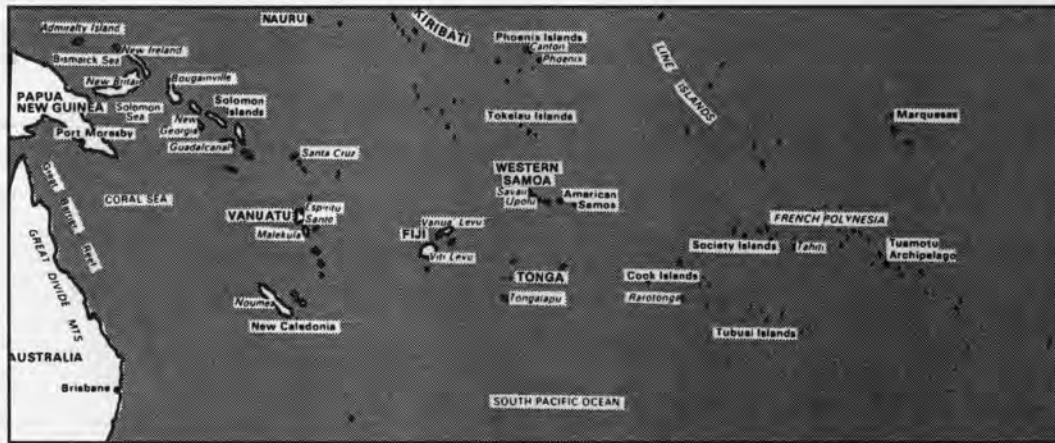
I am not a good swimmer. If I dropped my car keys into the deep end of a swimming pool, I would not be able to retrieve them from the bottom. If I saw a kid crying because his beach ball was floating away on a lake, I'd promise to buy him a new ball. If I fell overboard, I'd be history. So it seemed surreal that I was snorkeling in the four-foot deep lagoon of Bora Bora, ten feet away from at least a dozen feeding sharks. No barriers existed between the sharks and me except a rope I was hanging onto and two young Tahitian divers who were tossing the sharks a breakfast of freshly-killed fish.

I know there were at least a dozen sharks because that's how many black-tipped fins I counted cutting the water. The fins made short, sharp, darting turns and created a foamy turmoil in the otherwise calm lagoon. I ducked my head below the surface for a fuller view through my snorkeling mask. Their cold, menacing eyes blinked occasionally. Their gill slits pulsed rhythmically in blue-gray rubbery skin. And they all looked in a bad mood. Their chomping mouths and clearly visible jagged teeth made me back away slightly, although I heeded the Tahitians' advice to stay near or risk losing one of my "feets."

I was scared the whole ten minutes of the shark feeding even though the diners were only reef sharks that rarely are as long as five feet and never go looking for human brunch. Even the knowledge that tourists had been watching this sharkfeeding show without incident for the last five years failed to reassure me. These sharks didn't live at Sea World, they lived in the ocean. They were not tame just because they came around every morning for an easy meal and had not yet done anything impolite to hurt the tourist trade. I knew there was a chance that one shark, maybe a rookie to the ritual, might take a nibble out of me. But I was ready with clenched fists because



Ray Begovich is a veteran newspaper reporter currently working as a staff writer at the Ball State University News Bureau in Indiana. He is co-author of the revised version of The Craft of Public Administration, a political science textbook to be published in 1990. "Most people dream about giving up the daily rat race and moving to a tropical island. I thought it would be interesting to relate my personal reaction to Paradise—a reaction many would share."



I had read up on Tahiti and Bora Bora and Polynesians and Marlon Brando and the *Bounty* mutiny, and I knew that if a shark came toward me the best thing to do was punch him square on the snout and hope he was stunned enough for me to make a rapid getaway.

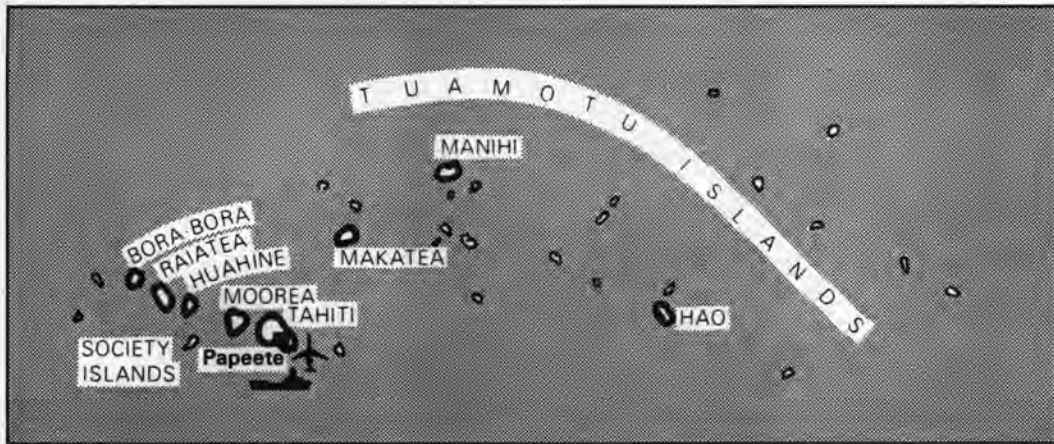
So there I was—a guy from suburban north Chicago who could barely swim, who would rather watch a Cubs game on TV than go to the beach—ready to slug a shark in the South Pacific. And that was just one of the incongruities that abounded during my three-month stay in French Polynesia.

About midway between South America and Australia lie the islands now known collectively as French Polynesia, that have captured the escapist imaginations of countless persons around the world for more than 200 years. They come in two varieties—big, solid islands with sharply ascending mountains (the remnants of their volcanic origin) or small, flat atolls whose topography is not much more than a nice place for sea birds to take a break.

The image of Tahiti as paradise has been pounded into our heads for a long time. Captain Samuel Wallis was the first European to walk ashore on Tahiti, and he did so under the British flag in 1767. Since then, the heaven-on-earth image of the island has stuck.

Tahiti is famous partly because of the famous people who were awed by it and reported its wonders to the rest of the world, including Captain Bligh, Fletcher Christian and the *Bounty* mutineers, Pierre Loti, Herman Melville, Robert Louis Stevenson, Thor Heyerdahl (whose *Kon-Tiki* sailed from Peru to French Polynesia), Paul Gauguin (who is buried in the nearby Marquesas Islands), Captain James Cook, Jack London, Rupert Brooke, Somerset Maugham, and Marlon Brando.

Brando owns the nearby atoll of Tetiaroa and there are occasional tourist trips for snorkeling and bird watching on his private island. Every circle-island tour guide on Tahiti will point out a house Brando owns near Tahiti's capital, Papeete. Trouble is, each tour guide points out a different house.



A tour of Bora Bora also points out a purported Brando condominium. Whether they are Brando's buildings or not, the mention of his name spices up a tour and makes the tourists feel rich and famous when they tell their friends about driving past Marlon's digs.

Tahitians are well aware that Brando is a big movie star and have been familiar with him since his *Bounty* movie was filmed in Tahiti in the 1960s. (Tahiti remains a popular film location for American, Australian, and European productions.) Manouche Lehartel, the director of the Museum of Tahiti and Her Islands, ran into Brando at a Papeete bank.

"He was waiting in line like everybody else," she said. "Everyone recognizes him but no one bothers him. That's why he likes it here."

French Polynesia is often referred to as France's most expensive mistress. It has a great deal of internal autonomy but is nevertheless guided by the government in Paris, half a world away. The territory consists of five main island groups—the Marquesas, the Tuamotus, the Gambiers, the Australs, and the Society Islands.

The best French Polynesian islands are Tahiti, Bora Bora, and Moorea—all Society Islands. When Americans pack their bags for their dream vacation to this part of the South Seas they don't say they're headed for French Polynesia or the Society Islands, they use that one magical word that has come to be synonymous with the whole territory—Tahiti.

I was working at a newspaper in southern Michigan in the dead of winter when the opportunity arose to spend three months in Tahiti working for a tourist publication. I jumped at it.

But Tahiti and I just didn't get along. At the end of my three-month sojourn in paradise, I was more than ready to return to the land of Big Macs and smokestacks. By then the sense of adventure had worn off, and without that Tahiti offered little for a person like me—a person whose peace of



mind depends on such modern extravagances as well-stocked libraries and pizza delivery.

However, I must admit that Tahiti is damn pretty to look at. My favorite part of the scenery was the mountains. I had a stiff neck my whole first month in Tahiti from constant mountain gazing.

Tahiti's mountains are not towering and majestic like the Rockies. They are low and jagged, vivid green, with peaks that fade into low-hanging, fluffy white clouds. One of my fondest memories of Tahiti is of a two-hour, bumpy jeep ride to one of the highest mountaintops, where I stood in the gently rolling foggy chill of a cloud.

That ride up the mountain also revealed a massive garbage dump covering an entire mountainside and filling a deep valley. Rising from the dump was a retching trash-and-smoke odor that completely annihilated the pleasant mountain aroma of Tahiti's flora and fauna. Narrow pillars of dark gray smoke twisted upward from various spots in the dump. A windowless white Volkswagen Beetle rested on the mountainside, held back from rolling into the valley by solid layers of trash.

Tahiti's mountains are where the small farming population tries to scrape a living off the slanted landscape. Tahiti's mountains are what tourists fly over in helicopters. Tahiti's mountains are where wild pigs roam free and where teenagers meet for all-night pot smoking. Tahiti's mountains are also where some rural poor eat the dogs they have stolen from pet owners living near the coast.

Another aspect of the lovely Tahitian landscape that caught my full attention that first month was the topless exposure of women at beaches and hotel pools. Call me immature, but if a woman is nearby with breasts bared, I'm likely to stare. In that first month, those stares were pretty intense and were accompanied by a sadness at thinking that this admirable form of sunbathing was common in so many areas of the globe but not in my native Midwest. Yet to my surprise, after a month of ogles, the topless ladies no longer held my rapt attention, but became like the mountains, part of the natural beauty of the landscape. Toplessness was no big deal anymore, except the time a female hotel executive whom I had interviewed before sat down with no top at my poolside table. I spent the entire conversation staring at her forehead.

A Frenchman told me how to tell whether a topless girl is American or French without ever hearing her speak. My own studious research confirmed his theory. A French girl who intends to sunbathe topless has her top off as soon as she hits the beach and will most likely not even have brought a top with her. The average American topless sunbather will still have her top on about an hour after she gets to the beach. Then she slips the straps of her bikini off her shoulder as if to avoid getting those nasty narrow tan lines. After a while, she



rolls onto her stomach with top still on but now unhooked as if to avoid that other terrible condition of a tan line across the back. Then she finally rolls onto her back, eyes tightly closed, leaving the top behind. When she realizes no one is paying any more attention to her than they are to the mountains in the background, she finally relaxes and may even be so bold as to walk to the lagoon to cool off.

Aside from such natural beauty, the beaches of Tahiti pale in comparison to U.S. beaches. There are only a couple of official public beaches not connected to hotels. The Tahitians are as proficient at swimming as Americans are at flipping through television channels, so Tahitians can venture into the ocean at almost any point around the island. But for casual tourists, it is best to stay on official beaches since ocean waves and sharp coral show no sympathy, no matter how much the trip cost.

Tahiti's beaches are covered with black sand. The island's hotels advertise the black sand as if it were a gift the gods bestowed on paradise rather than the result of volcanic eruptions. I have a one-word definition of black sand—dirt. It clings to skin with a vengeance, making everyone at the beach look in need of a good, long shower.

The best beaches in French Polynesia are found on the smaller, outer islands where tiny particles of ground coral make what is termed white sand. Though the white sand is attractive, it is somewhat rough on the skin. I found it ironic that the sand in paradise was inferior to the smooth, brown sand at Chicago's Oak Street Beach on Lake Michigan.

Much of the Tahitian coast is surrounded by barrier reef that causes waves to hit the island's shores gently. In locations where there is a break in the reef, the waves crash forcefully on jagged, rocky shores.

One place where the Pacific waves hit the island strongly is near the blowhole of Arapaho. The blowhole is nothing more than a small "cave" in the face of a rock wall just below the twisting road that circles the perimeter of Tahiti. When waves crash into the tiny cave, a small fountain of spray shoots into the air. The blowhole is a minor stop on most circle island tours.

The guide book "How to Get Lost and Found in Tahiti" offers a warning about the blowhole: "Don't go down on the platform." Below the cave is a flat hunk of black rock about ten yards wide that juts about twenty yards out from the shore. Several tourists reportedly have drowned when waves washed them off this platform.

I took a tour of the island soon after I arrived in Tahiti. We made a stop at the blowhole. It was a day with no breeze and the ocean was peaceful and calm. Our guide said that because there were no strong waves the blowhole would not do its thing for us, but we got out of the cramped van to take a look at the blowhole anyway.

I had a large, gray camera bag with me. I took my camera out and left the bag at the side of the road. I descended the rocks leading down toward the platform, but I remembered the guidebook warning and stayed high above the flat peninsula. A Japanese school teacher asked me to take a picture of her. She gave me her camera and she held mine. Just after I snapped the shutter, a strong wind blew up and I heard others in our tour group shouting something. I turned around just in time to see my camera bag, whisked by a gust of wind, plop into the ocean. Inside the bag were a small umbrella, about \$27 worth of French Pacific Francs and my passport.

I was stunned as I stared at my fancy camera bag, a gift from my wife, bobbing upright in the salt water. Suddenly, the bag floated right up to the edge of the platform. Our guide, a half-toothless middle-aged Polynesian man, shouted to me, "You can reach it now."

Without thinking, I scurried down the rocks and out onto the platform. About halfway down the length of the black peninsula, my camera bag floated right at the edge. As I bent to reach for the bag, a wave hit. A big one. It knocked me down. I was up to my neck in warm salt water. I twisted to my knees and held on to the slippery rock with my left hand while my right hand held the Japanese teacher's camera above the water. The whole thing couldn't have lasted more than five seconds as I waited for the wave to subside and felt it tug hard to bring me with it back to the sea. But I hung on and somehow even managed to keep the teacher's camera dry. As I was in the clutches of the wave, I marveled at how warm the water felt—a rather stupid thought for a man of my limited swimming abilities, a man almost swept into the same piece of ocean where others had drowned.

When the wave receded, I scampered up the rocks. The teacher quickly exchanged cameras with me. I caught my breath and turned to look back down the rocks. Most of the previously dry platform was now wet. My camera bag still floated and bobbed upright, but was now about forty yards from the platform. Dripping and still stunned, I raised my camera, zoomed in on the bag, and snapped a picture.

The camera bag seemed to live up to its waterproof claim, for when our van pulled away I could still see it far out on the ocean. I figure it washed up on the coast of New Zealand.

I reported the lost passport to the local gendarme post and to the Papeete police. The gendarme on duty simply said, "Why didn't you swim after it?" To board the plane when I left Tahiti, I had to use both a copy of the police report and a permission slip from the immigration office in lieu of the passport.

I spent most of my time in Tahiti in its capital city, Papeete, a place that is usually described as "a quaint harbor town." It is more accurately described as a city where morning



traffic can give you fits, a city where sickly-thin dogs roam the streets and where dead dogs are left lying, I had to alter the course I walked to work in order to avoid the carcass of a dog killed by a car and never removed from the roadside.

With a population around 80,000 (including surrounding villages) Papeete has many of the trappings of a modern city. A videotape rental store can be found around almost every corner. There are exclusive dress shops frequented by the wives of French bureaucrats. There is an excellent chain of bookstores known as Hachette Pacifique. There is a multi-level shopping plaza—the Vaima Centre—on the waterfront. As I left Tahiti, a shopping mall was being built just outside the city limits.

Yet despite its modern leanings, Papeete is still a tiny seaport town. Yachts from around the world anchor along the waterfront's Boulevard Pomare. Fishing boats also line the waterfront, as they are the main source of income for many Tahitians. The other types of ocean-going vessels to be found in the Papeete harbor are those of the French navy.

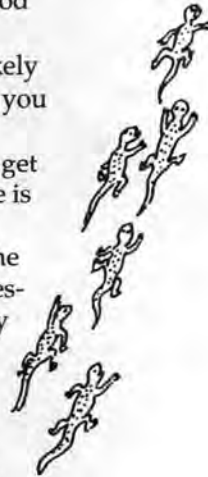
French military presence is strong in Tahiti, the headquarters for France's nuclear weapons testing. The actual explosions of nuclear devices take place far from Tahiti on the atoll of Muroroa near the Gambiers. Each time the French detonate a nuclear bomb, New Zealand and Australia protest vociferously. They say fallout drifts in their direction.

I walked the streets of Papeete nearly every day. Most of the businesses close Sundays except for some restaurants and the three multi-screened movie theaters, so Sunday is a good time to get a look at Papeete without the bustle.

If you start your Sunday walk early enough, you're likely to hear some marvelous, rich voices singing in Tahitian as you pass a church. As you continue your walk without the workday worry of being run over by a motor scooter, you get a good look at the architecture. The architecture of Papeete is a mixture of the modern and the ramshackle, with the majority of the buildings falling into the latter category. The post office is perhaps the most modern facility—it has an escalator. Most apartment buildings and stores look like they were pieced together from scraps.

At night in Papeete, the dominant image is of yellow beams of light darting everywhere. For some reason, the French like their cars with yellow headlights. A car I borrowed one night did not have yellow headlights. Its headlights did not work at all—a fact I didn't know when I asked to borrow it. Nor did I know until too late that the car was infested with spiders. That car gave me the most anxious drive of my life. I drove along Tahiti's curving, climbing circle island road with only the bright moonlight to light my way as I frantically brushed spiders off my legs.

I don't like spiders or any other kinds of crawling creatures. In fact, anything with more than two legs scares the hell



out of me. In particular, two kinds of creatures indigenous to the area bothered me no end. Lizards and cockroaches.

Before I left the States, I knew there would be lizards on a tropical island, but I didn't plan to be cavorting in the wilds so that didn't bother me. What I didn't know was that lizards are everywhere on Tahiti, even in a city of 80,000 crazy drivers and video addicts. Whenever you closed a door, you risked having to clean squashed lizard from the doorjamb.

One Sunday I took the Spidermobile around the island to find a couple of waterfalls I had heard about. I trudged up the path and began to think about turning back after about ten minutes of climbing and no waterfall in earshot. Then I saw hundreds, maybe thousands, of tiny baby lizards on the path, scooting quickly in and out of the nearby brush. I let out a yell of shock and in my hurry to turn and run, I fell chest-first right into the midst of the lizards. I was off the ground in a flash and running back down the path, slipping once more into the mud before I reached the bottom. I hopped in the car and drove like a Frenchman back to my hotel where I trashed my shirt and took the longest shower of my life.

A description of Tahiti is simply untrue if it doesn't mention the disgusting topic of cockroaches. The little bastards are everywhere. It's possible to stay at an expensive hotel for a few days and not see a roach, but they're there anyway. I've seen roaches in two of the most exclusive hotel dining rooms on the island. One morning as I walked past one of Papeete's most famous restaurants, I saw a woman sweep a bunch of dead roaches out the front door. I never rented an apartment in Papeete because every one I looked at had either dead or live roaches in it. In a grocery store, I saw a huge roach walking down the center of an aisle as if he were shopping.

"C'est tropical," said a Tahitian friend matter-of-factly when I explained my manic aversion to roaches.

"You obviously ain't never been to Florida or Georgia," said an American tourist about my roach phobia.

Well, I have been to Florida and Georgia and the Bahamas and Barbados and Puerto Rico and St. Thomas and St. Maarten and Martinique. I know roaches thrive in warm climates, but that doesn't mean I have to share my grocery cart with them.

But there is beauty in Papeete too. Perhaps the best thing about the city is the view it provides at sunset. One of the most splendid sights you'll ever see is the sun settling down for the night behind the island of Moorea, which rises out of the blue sea in full view of Papeete. You have to be ready to catch the sunset because the sun sets and rises quickly in that part of the world. From Papeete, Moorea appears to be very close, yet it's twelve miles away. I think Moorea is the most beautiful of all the islands I've seen. Moorea is much smaller than Tahiti; it is sparsely populated and has stunning jagged,



green mountains. (The name Moorea, I shudder to mention, means yellow lizard.)

On a bright afternoon on Moorea, I sat down at an outdoor hotel bar on the beach and ordered a Hinano, Tahiti's home-brewed beer. I looked out across the vast Pacific to where the dark blue of the sea met the light blue of the sky. I marveled at the scene and reminded myself that I was damn lucky to have the chance to experience such a splendid view. Then my beer came. I looked down and saw hundreds of ants covering the wooden bar and starting to climb up my Hinano bottle. I paid for the beer and left quickly.

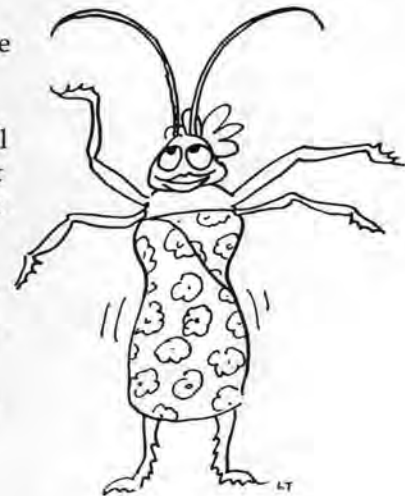
On a sweltering July day, I had to report on an outrigger canoe race that began in the Papeete harbor and continued around Moorea and back to Papeete. In order to get pictures of the race, I went out on a small cabin cruiser with a French medical team that was tagging along with the racers in case someone became ill or got injured.

Not only am I not a good swimmer, but I'm not much of a sailor either. I was in that tiny boat for nine hours—it takes a long time to row a canoe from Tahiti to Moorea, around that sister island, and then back to Tahiti. I was fine for the first two hours, but then the constant rolling of the waves got to me. I had to lean over the side three times during the race. The rest of the time I lay on the floor of the boat hoping there would be an emergency that would force us to return to Papeete. Whenever we got close to a canoe, one of the medical men would give me a shove. Then I'd get up on my knees, lift my camera, focus as best I could, snap a picture, and fall back to the floor in a fetal position.

Though not very good on the water, I got to be quite accomplished at using Tahiti's ground transportation "system." "Le Truck" is the appellation for the bus-type vehicle used by the average Tahitian to get around the island. Le Truck is simply an oversized pickup truck with walls and a roof built onto a flatbed. Inside, there are benches along each wall and sometimes a bench down the center.

The condition of the trucks ranges from dilapidated clunkers to shimmery, shiny new ones with flashing colored lights that pulse to the beat of a stereo. If you want to get close to Tahitians who don't work at a hotel or restaurant, then Le Truck is the way to do it. On a typical ride, I would be the only American, packed in with about two dozen barefoot Tahitians of all ages, while on the stereo Dolly Parton belted out "Take me to heaven before you take me home."

American music is popular with Tahitian teens, who are as up to date on the pop charts as any French or American kid. While the young Tahitians carried jam boxes with Madonna resounding from them, I fell in love with traditional Tahitian music. I covered the music and dance competition at the annual July festival. They keep changing the name of the



festival, but it is built around Bastille Day and Tahiti's internal autonomy celebration. The music group competition was a blast to listen to, and I even came to recognize songs that at first seemed wildly obscure. The songs ranged from gentle church hymns to bawdy love songs.

I saw a lot of dance shows and always got a charge out of the music, but I was rarely impressed by the bored dancers—even when they were banging their hips to and fro. One misconception I kept coming across when talking to American tourists is that the natives go around in grass skirts all the time and "just live to hula." In the first place, the hula is a Hawaiian dance not performed all that often in Tahiti. In the second place, the "natives" aren't going to dance unless they get paid for it.

Usually tourists see the colorful Tahitian dance shows at the major hotels, which offer dinner and dance show packages most nights of the week. The July festival dance competition is when the serious dance troupes compete in an intense rivalry for top honors in the most traditional forms of Tahitian dance. It's quite a spectacle to see, though most Tahitians watch the competition on the island's lone television station because tickets to the event are "très chers." Once while I was taking pictures at the side of the dance stage, I happened to glance down at one of the microphones used to pick up the sound for the TV broadcast. On the microphone was a sticker that said it was made in Elkhart, Indiana—the town where I went to high school.

The reports of Tahiti as paradise continue to flow back to the rest of the world. The people spreading the word these days aren't bold explorers, but rather journalists who are flown gratis to Tahiti for "fam trips"—familiarization tours designed to promote the tourist industry, which is vital to the regional economy. Some of the travel stories I've seen about Tahiti are solid, but most are written by journalists who spend a few days with the sun and surf and can't wait to tell their mesmerized readers about palm trees, topless beaches, blue lagoons and, well, Paradise.

Tahiti is only for tourists with thick wallets. A Coke costs about \$2, a Hinano runs about \$4. Just about every consumer good is imported except for coconut products and pineapples, which are exported. The necessary importation keeps prices high, but so do sky-high import taxes that offset the lack of sales and income taxes.

The merchants of French Polynesia are Chinese. They run the grocery stores, the souvenir shops and many small merchandise stores such as camera shops. The Chinese community in Tahiti is very close-knit and clannish, making it tough for Tahitian entrepreneurs to get a foothold. The Chinese do well financially, and to me that seems to be a nice bit of justice since they were originally brought to the island as slaves.

The French, of course, also do quite well. They are the island's white collar workers and bureaucrats. Despite their autonomy, Tahitians are definitely under French rule and they don't seem to mind that at all. Recent surveys showed that the majority of Tahitians have no desire to sever ties with France. The ties will never be severed anyway because there's no space in France to test atom bombs.

Although I had three years of high school French and three semesters of college French under my belt, I was far from fluent in the language. But I knew enough to get by, with a great deal of gesturing, and fortunately most people I came in contact with for my work spoke English.

I never learned more than simple greetings in Tahitian. Most Tahitians speak both their own language and French. Those who want to work in any business involving the tourist trade know they had better learn some English, since most visitors to Tahiti come from the United States.

The Tahitians themselves are part of the mythology of the islands. They have been portrayed for two centuries as extremely gentle, generous, even sexy people. That image is true to a point, but like everything else about Tahiti, it is overly idyllic.

Tahitians live in a delicate balance between the traditional and the modern. A Tahitian may be a construction worker but still live a life in which fishing, diving and canoeing are important to daily survival. While Tahitians do not enjoy a Western standard of living, there is no widespread, tragic poverty as in Central America.

I'll always be glad I got to visit Tahiti, but when my time was up, I was ready to leave. I had had enough paradise and was anxious to get back to my world.

On one of my last days in Tahiti, I was walking down a Papeete street in the early morning. I walked past a school that had a lot of trees, vines, and plants growing near its fence. Suddenly I felt something wet and clammy on the back of my neck. In absolute horror, thinking some slimy creature had landed on me, I violently brushed it off and then looked down to the sidewalk to see what it was. It was a tiare, Tahiti's lovely national flower. ■



Swahili: A Major African Language

Benji Wald

Most non-specialists, asked to name an African language, would probably name Swahili. Because there are so many languages spoken in Africa (over one thousand), Swahili has become important as an African *lingua franca*, with more than seventy million speakers (1990 estimate). It is known by more Africans than any other African language. Most of its speakers use at least one other language as well, usually one that is less widely spoken and is associated with their ethnic group. Swahili allows them to communicate beyond their own ethnic group and country. For this reason Swahili was adopted at independence as the national language of Tanzania, and, alongside English, as the official language of Kenya. Swahili is much more widely known than English in Kenya, although English is valued for its international contacts and as a mark of education and economic status. In addition to Tanzania and Kenya, Swahili is spoken in Uganda, Ruanda, Rundi, and in parts of Zaire, Malawi, Mozambique, Madagascar, and Somalia, all in East Africa. It is not widely spoken outside of East Africa. Yet, because in West Africa, as in East Africa, large numbers of languages are spoken by relatively small populations within any single country, some West African intellectuals have proposed the adoption of Swahili as an African international language. This is a tribute to the language's reputation, but it is unlikely to happen, because, in contrast to East Africa, West Africa has no historical tradition of speaking Swahili.

Swahili started out as the language of cities along the East African coast. While most East Africans have been farmers over the last thousand years, the residents of the Swahili cities have been involved with Indian Ocean trade. In pursuit of ivory and precious metals, Swahili traders organized expeditions into the East African interior. In this way Swahili spread westward into East Africa as a medium of trade. The spread of Swahili as a trade language was facilitated by the similarity of Swahili to many of the languages spoken in the interior. Because of trade oppor-

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tunities, the Swahili cities attracted settlers from southern Arabia and coastal Persia. Some coastal Swahili speakers trace part of their ancestry to ports in Iran. Many more include Southern Arabian clans in their lineage.

Because of their longstanding international orientation, even beyond Africa, the residents of Swahili cities are notable for their assimilation of non-African populations. This situation is reflected in many Swahili words. Besides original words, a great many words have been adopted from Arabic, including all numbers that are multiples of ten. European contacts started with the Portuguese in the early sixteenth century. By the middle of the nineteenth century, Zanzibar (Tanzania), was trading directly with the United States. By the end of the nineteenth century Kenya was colonized by England and most of Tanzania by Germany. Through the organization of trade and administration on a large scale, these European nations helped the further spread of Swahili into the East African interior. After the First World War, England gained control of Tanzania as well as Kenya.

All languages adopt words from other languages, and the words they adopt tell us much about their history. The differences in the occupational histories of Kenya and Tanzania are still reflected in some commonly used words in the Swahili of these countries. For example, in Tanzania the Swahili word for "money" is *hela*, originally referring to an early twentieth century German coin, the heller. In Kenya, the common Swahili word is *pesa*, referring to the Hindi (Indian) word *pais*, English *pice*. A more elevated word for "money" is *fedha*, the Arabic word for "silver." An older European word in Swahili is *gereza*, "jail," from Portuguese. This is still commonly used in Tanzania, but in Kenya the word *jela*, from English, is more common.

Swahili contains a great many loan words, words adopted from other languages. But how can we know what the original words were—the words used in the language when it was first spoken? The comparative method, by examining different languages, attempts to reconstruct an earlier prehistoric language from which historical and current languages descend. According to conclusions reached by this method, over time a language naturally breaks up into different languages in different areas, as Latin broke up into French, Spanish, and Italian. We don't know whether or not all languages are indeed descended from a single ancestral language, but linguists do recognize language families—groups of languages which descend from a single prehistoric language. Swahili belongs to a very large language family called Bantu. There are hundreds of Bantu languages spoken throughout subequatorial Africa. Indeed most subequatorial Africans speak a Bantu language.

The term Bantu itself comes from the South African Zulu word for "people." The Swahili word for people is *watu*. In Gikuyu, a Bantu language spoken in interior Kenya, the word is *ando*. These words can be further analyzed into a prefix indicating the plural: Zulu *ba-*, Swahili *wa-*, Gikuyu *a-*, and a root meaning "human being": Zulu *-ntu*, Swahili *-tu*, Gikuyu *-ndo*. In Swahili and most other Bantu languages, plurals are formed by adding a prefix to the root rather than a suffix. The Swahili prefix *wa-* usually corresponds to the English plural suffix *-s*, as in "person-s." Most words in Bantu languages also use a prefix to indicate the singular. Thus, the singular prefix for "person" in Swahili is *m-*. The singular forms for "person" are: Zulu *mu-ntu*, Swahili *m-tu*, Gikuyu *mo-ndo* (the hyphen is used here to analyze words into smaller meaningful units called morphemes).

Although the Bantu languages are similar in their vocabulary and grammar, most are not mutually intelligible. Nevertheless, the similarities are so numerous that it is relatively easy for speakers of other Bantu languages to begin to understand and speak Swahili as they become exposed to it. This is one of the main reasons that Swahili was able to spread

relatively easily into the interior of the Bantu-speaking domain, as trade routes were established between the Swahili cities of coastal East Africa and the trading centers of the East African interior. Because of its longstanding position in an international trade network, Swahili has borrowed more words from non-African languages than most other Bantu languages. Nevertheless, the majority of the common words in Swahili are of Bantu origin. These are the ones I have referred to as "original words" in Swahili. In addition, Swahili owes its grammatical apparatus to its Bantu heritage. What is said about Swahili grammar is equally true of most other Bantu languages. It is the distinctive grammar of Swahili and other Bantu languages which has most fascinated outsiders who have studied any of these languages.

The descent of Swahili and other Bantu languages from a common ancestor is about as obvious as the common descent of English and German. The ancestral Bantu language is estimated to have been spoken between two and three thousand years ago, in the southern Nigeria-Camerouns area, now the northwest periphery of the spread of the Bantu languages. From there the Bantu languages spread southward throughout subequatorial Africa, in one of the most rapid expansions of a language over a large area in reconstructable history. The Bantu family itself is related to a more inclusive language family called Niger-Congo, after the two major African rivers in the territory of this family. Most of the coastal West African languages from Senegal in the northwest to the Camerouns in the southeast belong to this family. Unlike Bantu, the Niger-Congo family was not recognized until fairly recently because the relationship between Bantu and the other Niger-Congo languages is not as easily recognizable, either in terms of original words or grammar. The Bantu grammatical type is also found, with some local variations, in some other non-Bantu Niger-Congo languages spoken in Senegal and Mali in West Africa. From this it is evident that most Bantu languages, including Swahili, preserve many aspects of the original Niger-Congo language (spoken perhaps as much as six thousand years ago) which have been lost in much of West Africa.

In Swahili as in any language spoken over a large area for a long period of time, the varieties of longest tradition and settlement are the most distinct from each other, and are only partially, if at all, understood by speakers of other dialects of Swahili. These varieties are spoken in the ancient Swahili cities of Somalia, the Kenyan coast, Zanzibar, and the Comoro islands (in the Indian Ocean between Tanzania and Madagascar). The speakers of these varieties of Swahili speak a form of it as their first language. To these speakers the term Swahili does not refer to a single language, but to the various languages of distinct peoples who have a special historical and cultural relationship to each other, including direct participa-

tion in Afro-Asian maritime trade across the Indian Ocean and the Islamic religion and customs.

Thus, for example, a form of Swahili called *Miini* is spoken in the Somali city of Brava. It is very different from the variety of Swahili called *Amu*, spoken in the city of Lamu, on an island of the same name in Northern Kenya. The Comorian varieties of Swahili are known by their island names, e.g., *Ngazija*, spoken on the Comorian island of that name. None of these varieties of Swahili are mutually intelligible. All are, of course, historically related, and rather more closely than to most other Bantu languages. However, they are all included in "Swahili" by a cultural tradition shared by Swahili speakers of the ancient East African coastal cities. The term "Swahili" itself comes from an Arabic word meaning "coasts." Speakers of traditional varieties of Swahili number between three and four million—a small minority of the overall number of Swahili speakers.

Most Swahili speakers speak varieties understood throughout East Africa. Standard Swahili is the variety used in the East African mass media, spoken and written, and taught in the schools. It is based on the traditional variety called *Unguja* (spoken in the city of Zanzibar), as a result of a deliberate policy decision made by the British authorities in the 1920s. Standard Swahili is not identical to the traditional dialect of the city of Zanzibar, since the standard has been specifically cultivated for administrative purposes. However, it is more similar to the Zanzibar than to other traditional varieties. This standard variety, and those spoken varieties which are very similar to it, have made Swahili the major language of East Africa and given it international recognition. Speakers of standard Swahili also speak another language, in some cases a local variety of Swahili, but more often a non-Swahili language of the Bantu family.

I have already mentioned one of the most obvious Bantu features of Swahili grammar, the prefixes attached to nouns to indicate whether the noun is singular or plural. Swahili nouns are organized into classes according to the class prefix attached to the noun. The class system of the Swahili noun is similar to the gender system of many European languages, but while European gender languages mark gender by suffixes to the noun, if at all, and have only two or three genders, Swahili marks class, or gender, by the class prefix, and there are many more class prefixes in Swahili than genders in European languages. Swahili class prefixes are organized into singular/plural pairs. Thus, beside the *m/wa* pair as in *m-tu/wa-tu* (person/people), there are many other pairs, e.g., *m/mi*, as in *m-ti/mi-ti* (tree/trees); *ji/ma*, as in *ji-cho/ma-cho* (eye/eyes); *ki/vi*, as in *ki-ti/vi-ti* (chair/chairs).

In contrast to most European gender languages, which are notorious for the amount of memorization needed to learn the appropriate gender for many nouns, the Swahili noun comes

complete with its class prefix, so that it is not necessary to memorize the class separate from the noun. Moreover, because the nouns come in singular/plural pairs, one can usually predict the plural form from the singular, and vice-versa.

This may not seem obvious at first, in view of the plural *wa-tu* for *m-tu* (person) but *mi-ti* for *m-ti* (tree). However the classes in Swahili usually have a meaning. For example, the *m/wa* pair occurs with nouns denoting humans, but the *m/mi* pair occurs exclusively with non-humans. One consequence is that *m/wa* can be added to many roots to form nouns denoting humans, e.g., *m-Swahili/wa-Swahili* (Swahili person/people). The *m/mi* pair is more varied, but one of its uses is to denote types of trees. Thus, it can be prefixed to roots denoting fruits to indicate the type of tree bearing the fruit, e.g., *m-chungwa/mi-chungwa* (orange tree/s). The fruits themselves belong to the *ji/ma* class pair, e.g., *chungwa/ma-chungwa* (orange/s), with the *ji* prefix omitted on a root of more than one syllable.

The reader may have noted that *m-ti/mi-ti* (tree/s) and *ki-ti/vi-ti* (chair/s) share a root *ti*. The *ki/vi* classes denote many manufactured objects. Literally, *ki-ti* refers to an object made of wood, but it is only used to denote a chair, made of any kind of material. The *ki-* prefix is further interesting because it is regularly used to denote languages. Thus, *ki-Swahili* refers to the Swahili language; that is, the language spoken by *wa-Swahili* (Swahili people). Similarly, *ki-zungu* usually refers to the English language. The root *zungu* refers to European origin, so that *m-zungu/wa-zungu* is commonly used to denote "white person/people" respectively. Thus, the use of *ki-zungu* for the English language is imprecise, but it is in common use. A more precise Swahili term is *ki-Ingereza*, where the root was borrowed during the period of Swahili contact with Portuguese, before the arrival of English. Actually, the *ki-* prefix used to denote languages is a specific case of this prefix to more generally denote a manner or custom, e.g., *nguo za ki-Swahili* or *nguo za ki-zungu* (lit., "clothing of Swahili" or "clothing of European") means "Swahili (European) style of clothing." Thus, the use of *ki-* is very similar to the English suffix *-ish*, as in Engl-*ish*, Swed-*ish*, Dan-*ish*.

Another feature of Swahili grammar related to the noun class system is class concord. The class concord system spreads a marker resembling the class prefix to many other words in grammatical construction with the noun. This is parallel to the agreement between a noun and, say, an article in European gender languages, e.g., Spanish *el edificio* (the building) but *la casa* (the house). Swahili goes further, however, and requires concord from other categories of words. The morpheme "of," as in *vi-ti vy-a m-tu* (chairs of man) "the man's chairs" shows class concord of *-a* with the *vi-* class word "chairs." Note that the class concord *vi-* becomes *vy-* before a vowel, in this case *-a*. The singular *ki-ti ch-a m-tu* (chair of

man), "the man's chair," shows a similar change in the class prefix. *Ki-* is pronounced *ky-* before a vowel in some dialects of Swahili, but in the standard language it further changes to *ch*. In the above cases, we can see that the class concord is basically the same as the class prefix but its pronunciation is altered by the sound that follows it. Some classes show a great difference between the class prefix and the class concord. Thus, for example, in *ji-cho l-a m-tu* (eye of man) and *ma-cho y-a m-tu* (eyes of man), the concords of *ji-* and *ma-* are *l-* and *y-* respectively. Actually the concords are *li-* and *ya-* respectively, but the vowels are elided before the following vowel.

The fuller forms can be seen before a consonant, for example, when the root *-le* "that" is used instead of the root *-a* "of," e.g., *ji-cho li-le* (eye that)/*ma-cho ya-le* (eyes those). Note that Swahili differs from English in placing the demonstrative "that" after the noun rather than before it. On the other hand, English and Swahili agree in using a form of concord between the demonstrative and the noun. In Swahili the concord is determined by the class prefix on the noun. In English there is a more general form of agreement by which the demonstrative "that" has a plural form "those" in agreement with the plural noun "eyes." As in English, the demonstrative can be used alone without the noun, e.g., *li-le/ya-le*, "that/those." The Swahili demonstrative, however, besides indicating singular and plural, as in English, also indicates the class of the noun. If the noun referred to belongs to the *ki-/vi-* class pair, the appropriate demonstratives are *ki-le/vi-le*, still respectively translated by English *that/those*.

There is one particularly interesting consequence of the difference between the form of some class prefixes and their corresponding concords. This has to do with the *n-/n-* class pair. The *n-/n-* class pair has a large number of words, e.g., *n-goma/n-goma*, "drum/s." According to the class prefix, this pair seems to be simply a single class which does not distinguish between singular and plural, similar to the way in which some English words like "fish" may be singular or plural. Such a notion is not unreasonable. The class concords, however, distinguish singular and plural members of this pair. The singular is *i-*, the plural *zi-*, e.g., *n-goma i-le/zi-le* (that drum/those drums) and *n-goma y-a m-tu* (drum of man)/*n-goma z-a m-tu* (drums of man). Thus, while "the man's fish" remains ambiguous for singular and plural in English, the Swahili concord distinguishes singular and plural for the *n-/n-* class.

To illustrate how extensive the class concord system is, here are examples of the *ki-/vi-* class pair. Bantuists have fixed identification numbers to the various noun classes. The *ki-* and *vi-* classes are known as 7 and 8 respectively. Therefore, in the examples, 7 and 8 are used to gloss the class prefixes and concords. (The prefixes and concords are printed in bold face for easier identification.)

ki-ti ki-le ki-refu ki-moja ch-a mtu ki-li ch-o-anguka
 7-chair 7-that 7-tall 7-one 7-of person 7-past-7-rel-fall

that one tall chair of the man's which fell

vi-ti vi-le vi-refu vi-wili vy-a mtu vi-li-vy-o-anguka
 8-chair 8-that 8-tall 8-two 8-of person 8-past-8-rel-fall

those two tall chairs of the man's which fell

In these two examples, in contrast with the English agreement, which only obtains between the demonstrative and the noun "chair," the Swahili displays six instances of concord. All modifiers of the noun follow the noun and show concord.

In addition there are elements of concord attached to the verb. The first element is a subject marker which concords with the subject of the verb. The subject marker attached to the verb is similar to *it* in English "the chair, *it* fell." However, in Swahili a subject marker is always placed before the verb, whereas in English the pronoun is usually absent. After the subject marker comes a tense marker. The tense marker *-li-* indicates that the verb is in the past tense, similar to the *-ed* suffix in English. But in Swahili the tense marker comes before the verb. In this respect the tense marker is similar to the future marker *will* in English, since *will* precedes the verb in English, e.g., "it *will* fall." In Swahili, all tense markers precede the verb, e.g., *ki-ta-anguka* (it-will-fall) where the future marker is *-ta-*, and *ki-na-anguka* (it-progressive-fall), "it is falling," where the progressive marker is *-na-*. In the examples, the tense marker is followed by a concord marker prefixed to the relative marker *-o-*. The relative marker *-o-* is equivalent to the use of English "which" (or "who" for human antecedents). However, the Swahili relative marker *-o-* occurs between the tense marker and the verb. If there is no tense marker, the relative marker follows the verb, e.g., *kiti ki-anguka-ch-o* (chair 7-fall-7-rel), "the chair that falls." This is the point of Swahili grammar which is most difficult for English speakers to master, because it is so different from English word order. Fortunately for the English speaker, there is an alternative method of forming relative clauses in Swahili, which is more like English. This is by means of *amba-*. Instead of putting the relative marker after the tense marker or verb, *amba-* can be used in the same position as the English relative pronoun "which/who/that," e.g., *kiti amba-ch-o ki-li-anguka*, "the chair which fell" (literally something like "chair which it-did-fall"). Note that the relative marker *-o* and its concord are suffixed to *amba-* instead of being suffixed to the tense marker.

The structure of the Swahili verb is also a consequence of its Bantu heritage. We have just seen that subject and tense markers are prefixed to the verb. There are also a great num-

ber of elements which can be suffixed to the verb. These elements have a number of different functions which are accomplished in English by other means. One set of elements suffixed to the Swahili verb are called extensions. One of the most commonly used extensions is called the applied or prepositional. It consists of a single vowel, either *-i-* or *-e-*, which is added to the verb stem. For example, the verb *pika* "cook" consists of a root *pik-* and an ending *-a*. The prepositional form is *pik-i-a*. If the syllable before the extension has the vowel *o* or *e*, then the extension is *-e-* rather than *-i-*, e.g., *som-a* "read" becomes *som-e-a*. The applied extension serves the same function as a number of English prepositions, e.g., *to*, *with*, *for*, *by*. Thus, *pik-i-a* means "cook for/with" and *som-e-a* means "read for/with," where "for" may refer to the person for whose benefit the action of the verb is performed, and "with" may refer to an instrument used in accomplishing the action. Another extension is *-ish-* or *-esh-*, selected according to the same principle as the applied *-i-* or *-e-*. This extension has a causative meaning. Thus, *pik-ish-a* means "to make cook" and *som-esh-a* means "make read" or "teach to read." It does not necessarily mean "apply pressure such that someone else carries out the action." It may also mean "let/allow (to cook/read/etc.)." Naturally, both the causative and applied may be used together, e.g., *pik-ish-i-a* "have (someone) cook for (someone else)," *som-esh-e-a* "have (someone) read for (someone else)." Various other extensions may be added, e.g., the passive *-w-*. Thus, *pik-w-a* "be cooked," *pik-i-w-a* "be the beneficiary of (someone else's) cooking," *pik-ish-w-a* "be made/allowed to cook," *pik-ish-i-w-a* "be the beneficiary of someone's making someone else cook." As the last expression shows, sometimes the suffixes allow an idea to be more easily expressed in Swahili than in English. The parallel expression *on-esh-e-w-a* consists progressively of the root *on-* "see," *on-esh-a* "cause to see" hence "show," *on-esh-e-a* "show (something) to (someone)," and thus *on-esh-e-w-a* "be shown (something)." Among the various verb extensions is the "reversive" extension *-u-* (or *-o-* following a syllable with the vowel *-o-*). This extension is similar to the privative verb prefix *un-* in English, as in *un-do*, e.g., *fung-u-a* "untie/open," (*fung-a* tie/close), *chom-o-a* "unskewer" (*chom-a* "skewer/stab"). Like the use of *un-* in English, it is restricted to actions which involve the contact of separable objects, so that they may be made to come apart from each other. Note that *fung-u-a* is an explicit reversive based on *fung-a* "close/tie," but is used as an equivalent to the simple English word "open" as in "open the door." It more literally means "un-close."

The question is often asked whether Swahili is an easy or difficult language to learn. Of course, for those who speak it as a first language, it is no more difficult than any language is to its speakers. On the other hand, many of the problems that come up in learning European languages with complex

gender and case systems, and irregularities in the formation of past tenses, etc., do not arise in Swahili. It may be safe to say that, given the same amount of time and effort, one can learn more Swahili grammar, starting from scratch, than that of many languages, including English. Many of the formations of Swahili words are quite regular. But the means of expression are not always the same in Swahili as in English or many of its European relatives. ■

Notes

For further reading about Swahili, I suggest the following general articles, which are not too technical in terms of linguistic terminology or issues of interest only to the specialist:

Benji Wald. *Swahili and the Bantu Languages*. In B. Comrie, ed., *The World's Major Languages*. Croom-Helm, 1987.

Thomas J. Hinnebusch. *Swahili*. In T. Shopen, ed., *Languages and Their Statuses*. Winthrop Publishers, 1979.

For a more complete pedagogical description of Swahili grammar, my first choice is any of the many reprints of E.O. Ashton, *A Swahili Grammar*. Longman, 1944.

Most of the other pedagogical descriptions of Swahili which have been published since Ashton's work, and are readily available in university or general bookstores, are also quite useful.

Imaging the Past

An album of historic photographs from the Western Reserve Historical Society

Elizabeth P. Kirk

Photographs give unique insights into history. The camera is not a selective viewer—it records objectively, often revealing more than the photographer intended. Fortunately, our predecessors saved photos. The more than one half million photographic prints and negatives that have been preserved in the Western Reserve Historical Society's collection help us know more about who we are and where we came from.

Photos that depict familiar events of a previous time can be fascinating. It is startling to see an old photo and know that it shows the way things were. *Cleveland Press* photographer Louis Van Oeyen's print of the Graf Zeppelin poised over Terminal Tower is a good example. The view of downtown Cleveland with the airship is not remarkable in itself. But the swastika is.

"Things become real when people can see the image of whatever is being discussed," says WRHS Reprographer Michael McCormick. "Photographs take away the abstraction that a historical subject can have." Visiting the photograph collection at WRHS is like taking an illustrated tour of places in the past and actually seeing history, instead of only reading about it.

The WRHS Photograph Collection focuses primarily on Cleveland and the Western Reserve. Eighty percent of it concerns industrialization in Cleveland, the residents of Northeastern Ohio, and the social history of Cleveland and the Western Reserve. Within this scope there is great diversity.

There are thousands of portraits. Some depict the rich and famous, such as John D. Rockefeller and William Howard Taft. One group picture shows the dashing aviator Charles Lindbergh—on horseback. Many of them portray citizens who are unremembered today, except perhaps by surviving relatives or friends.



"Variety is the charm of freelance writing," says Elizabeth Kirk. "In the span of a week, I may be working on profiles of professional dancers, writing a brochure on cocaine, and drafting articles on asset lending." Because of her interest in historical research and photography, it was inevitable that she would discover the Western Reserve Historical Society photo collection, and in discovering it, introduce it to interested readers.



Cleveland photojournalists like Louis Van Oeyen, Andrew Kraffert (*Plain Dealer* photographer, 1906-56), and commercial photographer Geoffrey Landesman captured the abundant life around them and preserved it in their photographic negatives.

Ethel Standiford, one of Cleveland's first female professional photographers, portrayed area notables from the early 1900s through the 1930s. Allen E. Cole, prominent Black commercial photographer, left a vivid portrait of Cleveland's Black community from the 1930s through the 1950s. Their work documents now-vanished ways of life.

The changing profile of Northeast Ohio and its inhabitants is revealed through the WRHS photographs. The Cleveland City Photographer's negatives show views of Cleveland in the early 1900s—horses still competing with streetcars for road space. Most buildings that existed at a city address from the 1930s until the 1950s are pictured in the Cleveland Water Department photographs of the sewer district. Over 20,000 aerial survey photographs map Northeastern Ohio from 1925 until the 1950s.

Commerce builds cities, and the corporate photograph collections demonstrate how technology and industry have evolved and shaped urban development. Precision tool making is documented in the Warner and Swasey and the

Hitler's famous dirigible "Graf Zeppelin" came to the U.S. on a "good will" tour in 1933, and made a flyby over Cleveland on October 26. Louis Van Oeyen took this shot at 2:20 p.m. from the roof of the Halle Brothers department store.

Lamson and Sessions photos, and the iron trade in the McDowell-Wellman set. The TRW collection traces the history of the automotive and aviation industries.

The Wallace A. Cathcart Shaker Collection is a treasury of photos, newspapers, and manuscripts about the Shakers. It is the world's largest primary resource on this sect with many photos of their community that once stood on what is now Shaker Heights, Ohio.

The twenty percent of the collection not devoted to Northeast Ohio includes some of the WRHS's finest photographs. There are the Franklin S. Terry World War I photos and the William P. Palmer Civil War Collection, which contains rare photos of blacks in the Antebellum South. Time-Life has used hundreds of WRHS photos to illustrate its multi-volume series on the Civil War.

Alexander Gardner's "Scenes in the Indian Country" present a visual record of the building of the Transcontinental Railroad. William Henry Jackson's portraits of American Indians taken in 1870-71 during a geological expedition to the American West depict a culture on the verge of change. Both provide an unforgettable portrait of that region just before western expansion would transform it forever.

The term "photographs" most commonly refers to photographic prints on paper. But when the WRHS was founded in 1867, paper printing was not the only method in common use. There are tintypes and ambrotypes in the collection, as well as examples of other metal- and glass-plate processes used at that time. Daguerreotypes dating from the 1840s and 1850s are the earliest items. The tintypes date mostly from the 1850s to the 1870s. Soldiers could have tintypes made on Civil War battlefields and mailed home; they were sturdier than glass or paper images.

There are stereographs and thousands of postcards, some dating back to the 1880s. The *cartes-de-visite* are even older. These small business-card-sized portraits were popular as calling cards between 1853 and the 1870s. WRHS owns one of Abraham Lincoln.

"It's safe to say that the WRHS Photograph Collection started virtually by accident," says McCormick. It was a by-product of the general collection: photographs accompanied historical records that were donated to the Society. Most photographs are still acquired through donation, though occasionally items of local importance are purchased.

Now the collection is an important documentary resource that supports WRHS's vast manuscript holdings. In 1972 a photographic specialist was added to the staff.

Conservation is critical with photographs as it is with manuscript materials. Like the other WRHS records, the photographs are preserved in a climate-controlled environment and stored in acid-free folders and boxes. Inevitably, some prints and negatives have arrived at WRHS in poor con-

dition. These are copied before further damage occurs. Some photographs, especially the older ones, exist only as prints, without surviving negatives. Archival printed photographs reputedly will last about a thousand years.

Genealogists and historians are not the only users of this excellent collection. It is housed in the WRHS library and is open to anyone who enjoys looking at photographs. There is an admission charge of \$4.00 per day to work in the library, and visitors are asked to sign in with the librarian. This charge can be avoided by joining the Society at a cost of \$25 for individuals and \$35 for families.

Accessing the photos isn't difficult. There are several ways to locate photographs. Approximately 40% of the images are in small groups of one to twenty photos. These are listed in the Cleveland Subject File in the card catalog, alphabetized by subject (for example, "Cleveland Buildings—Terminal Tower").

The other 60% of the collection is organized into over 300 large picture groups. These are arranged by collection title (e.g., "Edgar Decker Portrait Collection, Picture Group 44"), and the contents described in printed inventory lists. Picture group titles are indexed in the Picture Group Index in the card catalog.

If researchers wish to examine some of the nearly 100 pictures of John D. Rockefeller, for instance, they can ask to see the Portrait File located at the reference desk. This list is indexed by portrait and subject and describes available photos.

The librarians are knowledgeable about the photographs and will be glad to help users find what they are looking for. There is currently no tool for locating photos equivalent to the guide to the WRHS Manuscript Collection published in 1972. As Michael McCormick says, "the collective memory of the staff is the best finding aid we have at the moment."

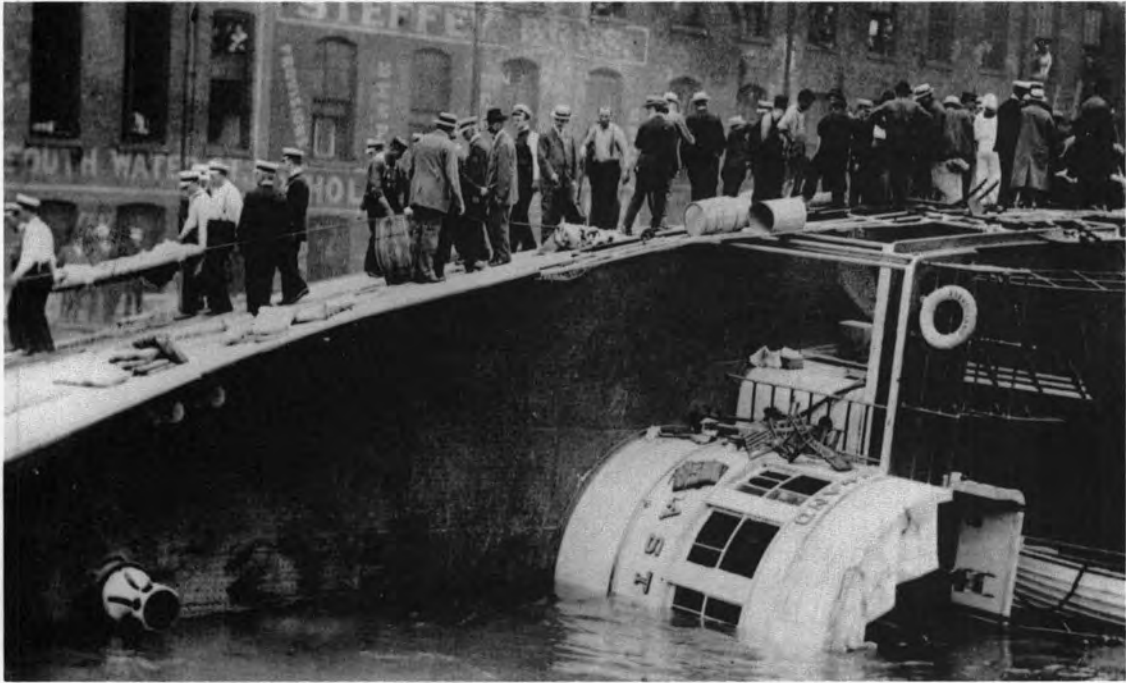
The photograph and manuscript collection of the WRHS is a major historical resource for the region and the nation. To receive information about it, call 216-721-5722 or write to The Western Reserve Historical Society Library, 10825 East Blvd., Cleveland, Ohio, 44106. ■



Photo by Louis Van Oeyen: Lou Gehrig takes time out to sharpen his yo-yo technique at Cleveland's old League Park, June 12, 1922.

Margaret Bourke-White: Dancers in the French Casino, "one of the spots for gaiety and entertainment in the Great Lakes Exposition," 1936.

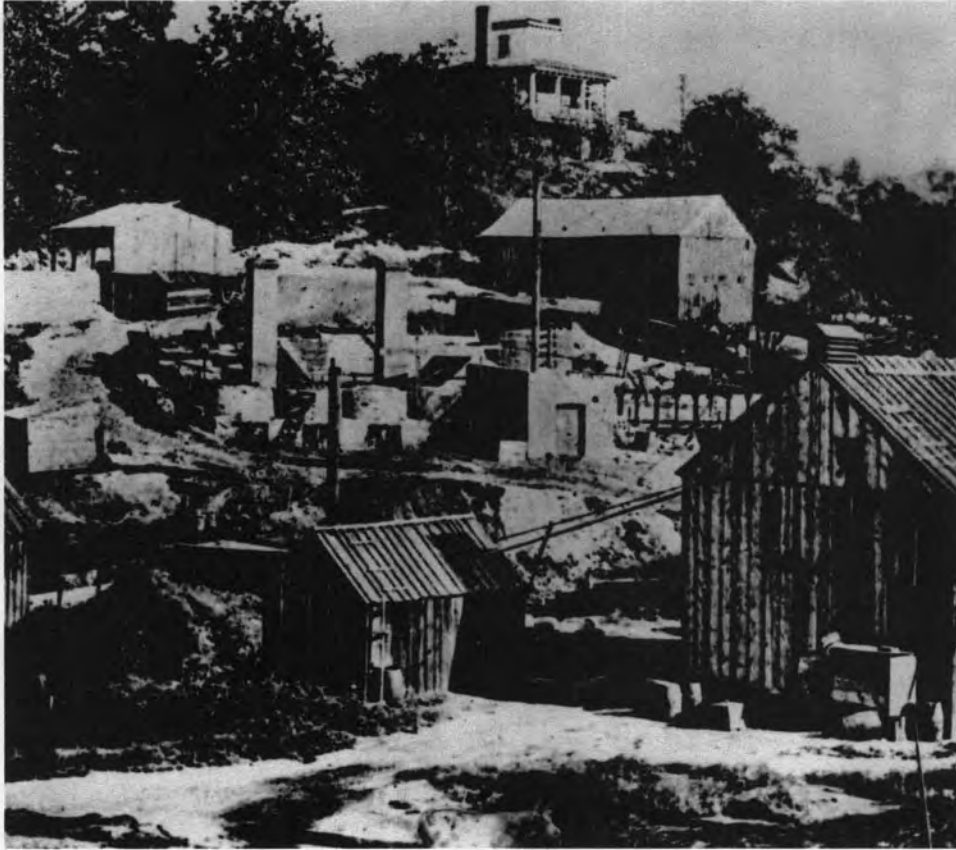




Above: Photo by Andrew Kraft: Hundreds of lives were lost on July 24, 1915, when the passenger steamer "Eastland" sank in Chicago Harbor.



Left: On October 20, 1944, a tank of liquid propane gas exploded at the East Ohio Gas Company, leveling property for blocks around. In this photo, bystanders watch as the blaze threatens the last remaining gas tank at the East 61st Street facility.

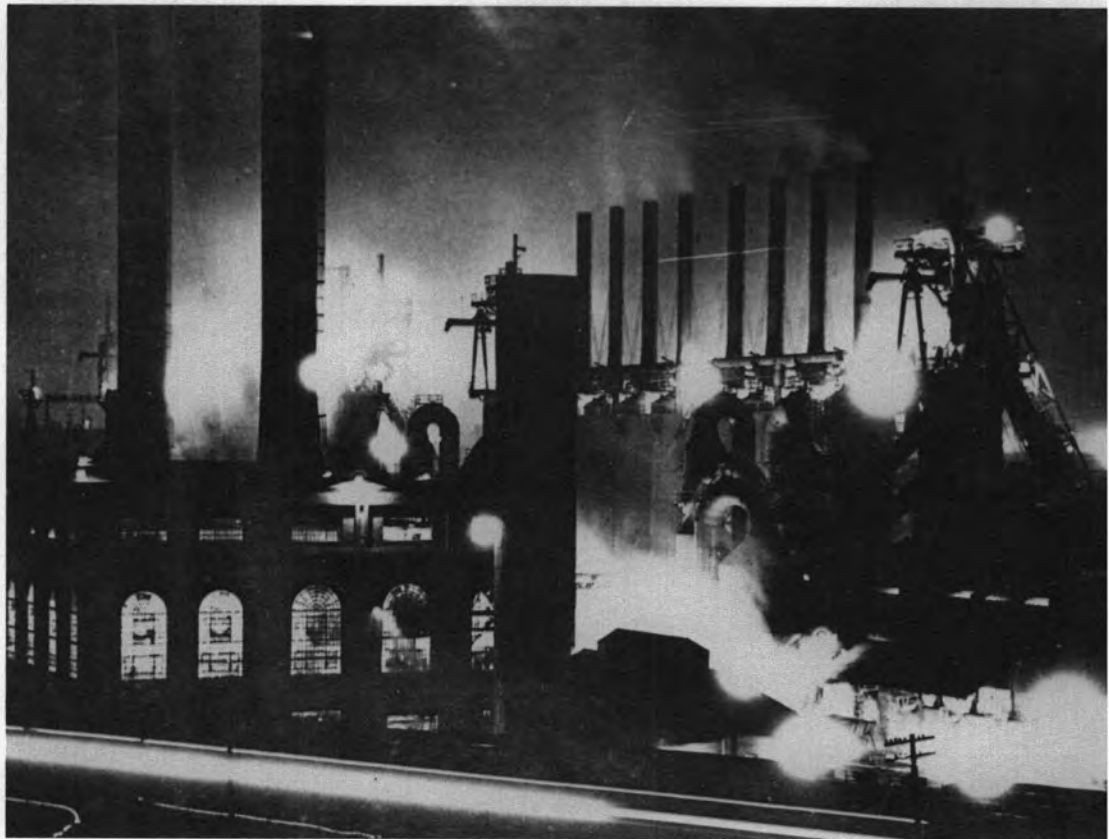
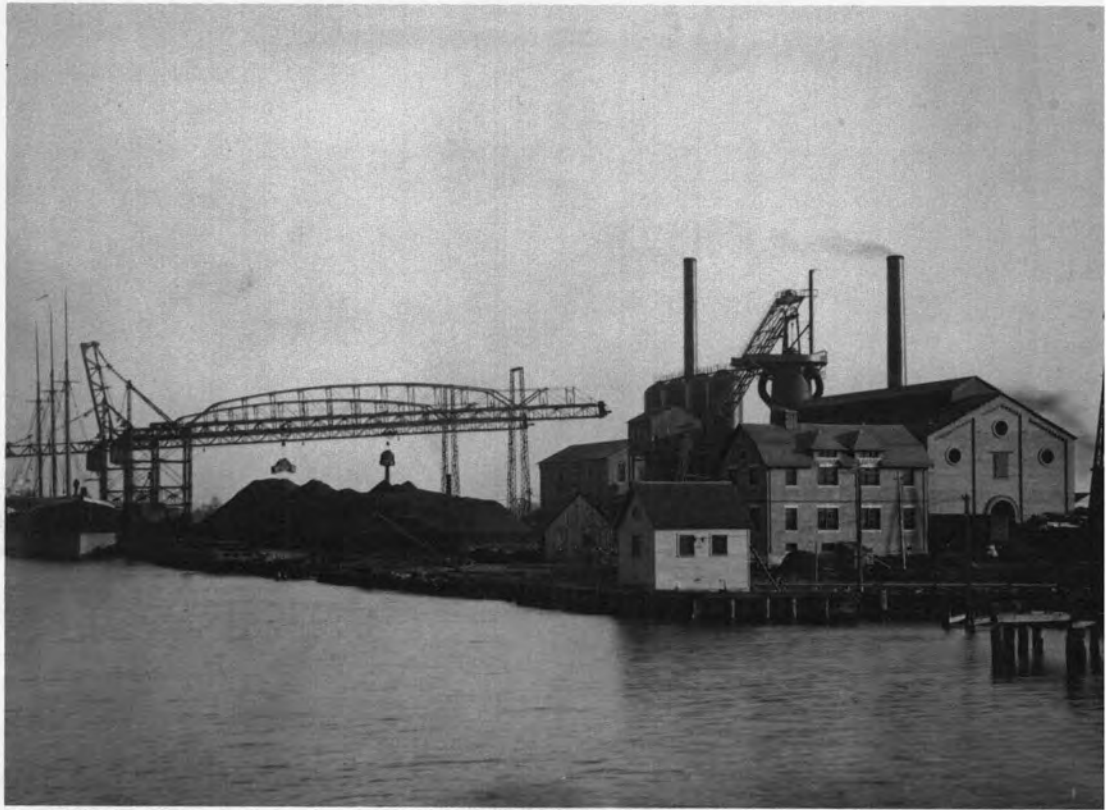


Photos taken less than twenty years apart illustrate the growth of the oil industry. Above, Standard Oil's Refinery No. 1, south side of Walworth Run in 1870; below, Standard Oil Corp. works in 1889.





Workers in the Bowler iron factory, around 1880.





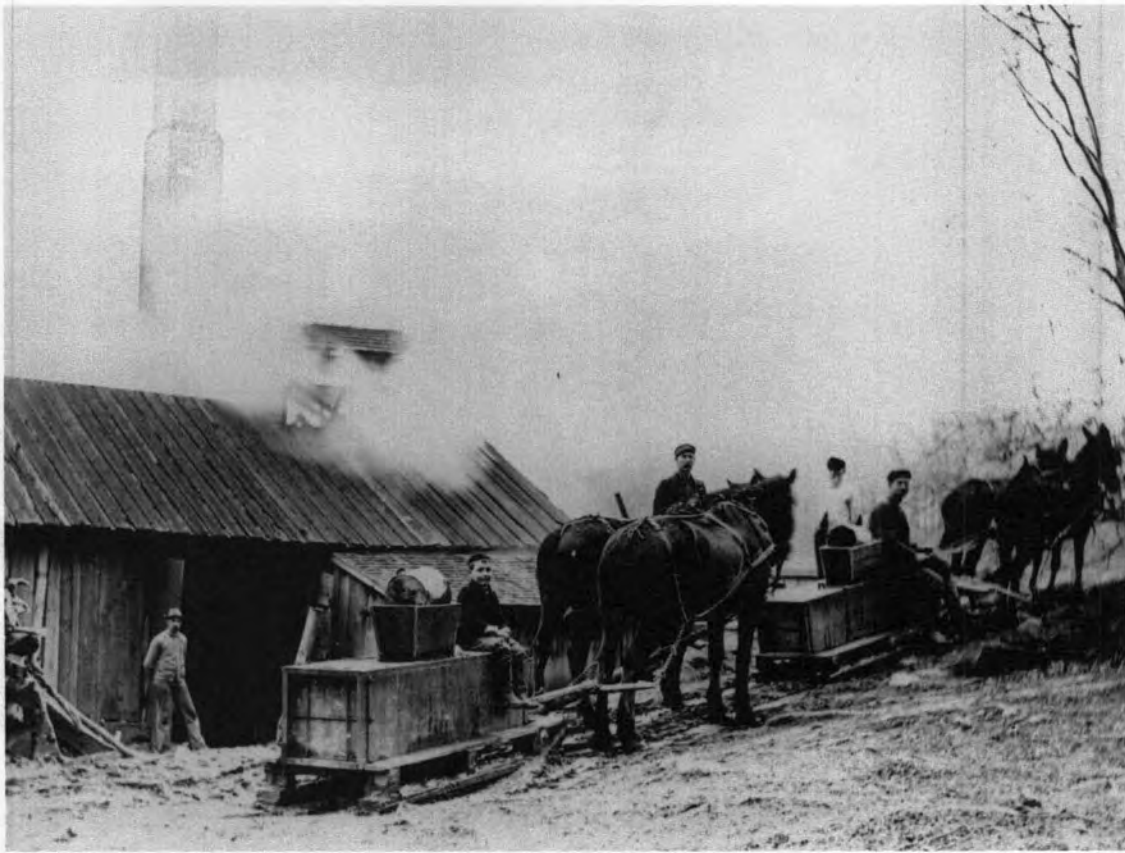
Opposite page, top: during the early 1900s, schooners plied the Great Lakes carrying iron ore. This early steel mill, probably in Conneaut, Ohio, is at the forefront of the technology that will soon make commercial sailing ships obsolete.

Opposite page, bottom: Republic Steel, Corrigan-McKinley Works.

Above: shopping in Cleveland's downtown at West 6th Street and Superior Avenue during the 1870s.



From the Cathcart Shaker Collection: School day in the Shaker village of White Water, Ohio, date unknown, possibly the mid-1800s. Although the Shakers practiced celibacy, some children came into the settlement when their parents adopted Shaker beliefs, others were foster children taken into the Shaker community.

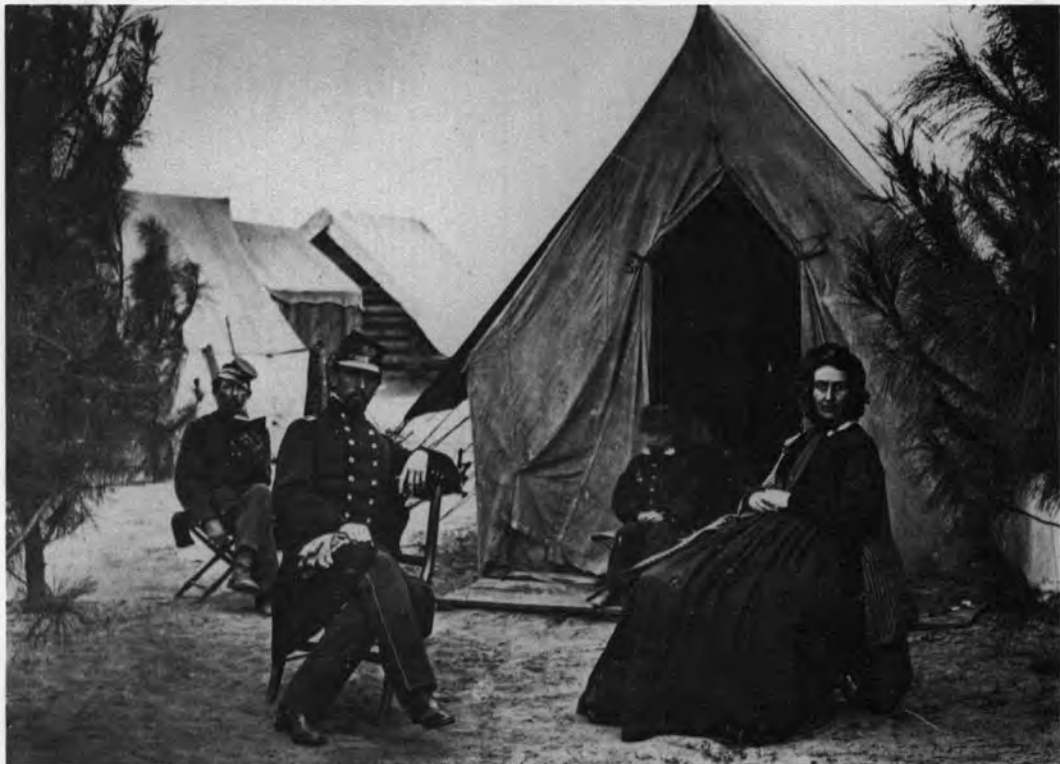


Harry Albaugh, a Cleveland dentist and avid amateur photographer, left a photographic record of Ohio rural life in the early years of this century. Here he shows a crew emptying the sap sheds at a maple sugar house in 1914.



From the WRHS holdings of photos from outside of the Western Reserve. Above: Alexander Gardner, a Washington-based photographer, took these "Scenes in the Indian Country" in 1869-70, for J.D. Cox, Secretary of the Interior. Here is "Peace Commissioner Boggy in council with the Sacs, Foxes, and Kiowas."

Below: Henry P. Moore was a New Hampshire photographer who worked out of the Union base at Hilton Head, SC, during 1862-63. Here Surgeon A. A. Moulton of the 3rd New Hampshire Regiment is shown with his wife and son, sitting outside of their quarters on Hilton Head.





This gentleman, posing for New York photographer Charles Dana, is John D. Rockefeller, who began his business success in Cleveland.



Here is "the richest man in the world" some fifty years later in Tarrytown, New York, cutting his birthday cake at age 91.



Flora Stone, daughter of the wealthy industrialist Amasa Stone. She married Samuel Mather, the "richest man in Ohio," in 1881. She was instrumental in establishing Mather College, the women's college at Western Reserve University, which was named in her honor.



Allen E. Cole, prominent Black Cleveland photographer, took this picture of matriarch Frances Smith surrounded by her family on a summer day in 1941.

Author's Note:

Sincere thanks to Michael McCormick, Reprographer; Ann Sindelar, Reference Supervisor; and John Grabowski, Curator of Manuscripts, for their invaluable assistance with this project.

All photographs for this article are provided through the courtesy of The Western Reserve Historical Society and printed with its permission.

Police Stress—The Hidden Enemy

David Regetz

"Due to the stress of police work, you have taken about eight years off your life by accepting this job." These were among the first words I heard as a member of the 91st Cleveland Police Academy Recruit Class. As I went through the Academy and out on the street, I learned that stress is an enormous and unavoidable job hazard of my profession, a view confirmed by many researchers, administrators, and clinicians. As one psychologist has asserted, "it is an accepted fact that a police officer is under stress and pressure unequalled by any other profession."¹

Stress in a broad sense means the body's response to demands placed on it. While the word has acquired negative connotations, stress can be considered positive. For example, stress posed by a sporting event or a final examination can challenge a person to excel. But as I will use the term, police stress refers to negative stress experienced by a police officer in the performance of his job.

Most studies point to suicides, divorces, alcoholism, and health problems as effects of police stress. Suicides among police officers are reported to be six and a half times those of the average population and twice the rate of physicians, the second highest group.² John Stratton has written in the *F.B.I. Law Enforcement Bulletin* that

law enforcement marriages as a group have one of the highest divorce rates in the country. While there is a general trend in society toward less stable marriages, law enforcement marriages have stresses inherent in them which can create specialized difficulties that don't exist in other marriages.³

In one study, alcohol abuse was found to be a problem for 25 percent of police officers,⁴ and Jerome H. Jacobi, a psychiatrist who worked with police officers in Los Angeles, found that over 27 percent of the officers he evaluated had medium-high or high risk of coronary heart disease.⁵

David Regetz has been a policeman for ten years, and currently holds the rank of Lieutenant with the Cleveland Police Department. "As a police officer, I have experienced or have seen co-workers experience things I have written about. Writing the article helped me to understand some of the problems I face." Regetz hopes that his article will help the public to see the police officer's work with more understanding and sympathy.

There are a number of clearly identifiable causes for these shocking statistics. One cause is stress that occurs during the actual performance of police work: the hazards of the job. Another is the police department itself, which, by virtue of its bureaucratic organization, causes frustration among the police officers it employs. And then there is the conflict between the police, the criminal justice system, and the citizens that the police serve.

A police officer is subjected to stress from the very nature of the job. He is required to endure long periods of boredom alternating with the need for sudden alertness and mobilized energy. The officer must stay alert regardless of the circumstances. He is aware that one lax moment may cost him his life. More than 70 percent of the time fatal confrontations erupt during the so-called routine patrol, especially when officers are attempting arrest, responding to domestic disturbances, investigating robberies in progress, and conducting traffic stops.⁶

Consider this scenario, variations of which I have experienced many times. It is a cold, windy night in April. You are working the midnight shift and touring your beat in the inner city in your warm patrol car at three in the morning. It has been so quiet that you and your partner sit silently, having run out of things to talk about. Suddenly you observe two autos approaching at high speed, both going through a red light. You make a U-turn as you sit straight up in the seat. On come the overhead lights and the two autos pull to the curb. A male gets out of the car closest to you but you can't see his right hand. Danger signals begin flashing in your mind as you get out of the police car and draw your revolver at the same time. Something tells you this doesn't look right. As the cold wind slaps your face, you point your weapon at the man standing outside the car. You tell him you want to see both of his hands. He complies. You approach the car slowly as there are still other occupants inside. When you get to the car you see the gun the male dropped on the driver's seat. After calling for backup help, you get the three other people out of the car and the incident is over. You find out that this male and his friends were trying to rob the person in the first car who was trying to get away. Inside the suspects' auto you see pink and blue pills lying all over that you recognize as common illegal drugs. Now come the routine tasks: towing the car, booking the suspects, and writing reports. But the adrenaline high continues for several hours. This swing in emotions can occur several times in a single shift. Yet the police officer is expected to maintain a detachment from his emotions and act professionally in every situation.

The most dangerous and traumatic experience that an officer can be involved in is a shooting incident. Under the best of circumstances, the strain of law enforcement is immense,

*One lax moment may
cost him his life.*

but at no time is it greater than after a fatal confrontation. Even in the absence of physical injury, the psychological stress caused by such experiences can be profound. Officers have burst into tears, vomited, lost bladder and bowel control, or thrown down their guns and walked away never to return to police work.

Most often the impact is not so swift. It is likelier to set in days, weeks, or even months later. Some therapists call this phenomenon after-burn, others use the more clinical term post-shooting trauma. In any case it is likely to change an individual's life permanently.

In post-shooting trauma the mind tends to dwell on the violent feelings associated with a shooting incident. The constant replaying of the incident in the mind can be even more devastating than the shooting itself.

Here is a classic illustration; it happened to a patrolman in Tennessee. One night he was on a stakeout in the back room of a liquor store, hoping to apprehend a team of robbers who had been holding up businesses late at night with increasing regularity. As he watched, two men entered the store and announced a robbery. When the assailant struck the storekeeper on the head with a gun, the officer burst out of the back room and leveled his shotgun. The suspect with the pistol turned and aimed the gun at the officer. The officer shot, killing the suspect instantly. The other robber hesitated a moment and the officer begged him to give up. The second male was shot as he tried to escape out the door. He survived for thirty minutes, and the officer later recalled the robber gasping for breath as he slowly expired.

Before the shooting, the officer was known as a stable, hard-working, family-oriented man with a good circle of friends. Within six months, he had become an alcoholic. His wife left him because she could not tolerate the changes in his personality. Six years after the incident, the police department fired him because of his uncontrollable drinking. He was unable to hold another job. Finally, after eight years, he was awarded a disability pension.

Officers who have been involved in shootings know you can never predict exactly how you will react afterwards. Most agree that it is never what you expected. Frequently-mentioned reactions include guilt, anxiety, fear, nightmares, flashbacks, social withdrawal, insomnia, and impaired memory and concentration.

An officer who has a partner seriously injured or killed can suffer many of the same effects. Psychologist Wayne R. Hill, president of Management and Behavior Consultants, described one of his experiences in working with officers involved in shootings. The officer described the surprise on his partner's face after a gunman had just put one bullet into his chest. As the partner turned around, he covered the bullet



Formula for stress: long periods of boredom alternating with the need for sudden alertness and mobilized energy.

hole with his hands, and the blood was spurting out between his fingers. He died at the scene within minutes. This led the surviving officer to experience recurring nightmares and flashbacks, and he required months of therapy before he could return to work.⁷ Still, chances are the officer will be second-guessing himself for the rest of his life, wondering if there was something he could have done to save his partner's life.

Stress on the police officer can also come from within the department itself. Sometimes the feeling of futility from these pressures can be worse than the stress from on-duty experiences. When the officer is dealing with a situation on the street, he has some control over the outcome. In organizational matters he has little or no control and must adhere to the mandates of the administration or face discipline.

Consider the typical internal investigation of a complaint made by a citizen against a police officer. In any police organization, an officer can be accused by anyone of doing something illegal or unprofessional. When this occurs, the internal affairs or complaint division will conduct a full investigation. During these investigations officers sometimes see themselves as having fewer rights than the criminals they apprehend.

Say you are a conscientious police officer performing aggressive police work over and above the required amount. One day at roll call your sergeant tells you to report to the

complaint unit. As you drive downtown you wonder what they want you for. When you arrive at the office, a man who you know is a policeman but who is dressed in a suit and tie tells you to sit down at a desk with a typewriter. He then informs you that a person you arrested for being drunk and creating a disturbance at a bar two weeks ago has filed a complaint saying he had \$200 when you arrested him and only \$20 when you inventoried his personal property at the booking desk. You are told you have to type a report explaining the circumstances surrounding the complaint. You know that if you were a criminal, you would not have to make such a statement without a lawyer. But this falls under the category of an internal investigation and is not accusatory at this stage. If you refuse to type a report, you are subject to departmental discipline. So you complete the report. After this it is time to go back to work to serve the citizens you are sworn to protect, including the one who made the false accusation. With luck, in a month or so you will be told the complaint was ruled unfounded. Until then, just go out and do a good job.

Another constant source of irritation for the police officer from within the department is the traditional style of police management. This method relies heavily upon strict discipline and compliance with orders. Because of the critical nature of police work, it is imperative that sound discipline be maintained. Decisions must often be made on scant information and without consultation. Granting this, there are nevertheless serious problems with traditional methods of police management which concentrate the authority in the hands of a few and which fail to consider the consequences of organizational policies on individual members. The rank-and-file patrol officers who are required to perform the less glamorous work in the department are rarely consulted about decisions that affect them. As better educated people enter the profession, the potential for this organizational frustration increases. The police officer on the street begins to feel that administrators have either forgotten the people at the bottom or don't care. As police scientist Martin Reiser has noted,

Job tenure and a living wage are no longer enough to keep the young policeman happy. Like others in our society who are upwardly mobile, when survival and security needs have been met, he wants to be in on the organizational action. He wants to know the reasons for actions affecting him and to feel he has some say in the decision-making process.⁸

Methods of assignment and promotion can be sources of organizational stress. Even if policies and procedures are executed in a technically proper manner, they can still appear to be biased. Consider the feelings of the officer who is passed over for promotion because of affirmative action mandates that he regards as unfair. Or the officer who applies for a detective assignment only to find that another officer who happens to know a high-level supervisor has obtained the

No matter what action he may take, there will always be someone to criticize them.

position. Circumstances such as these are not easily forgotten and can be magnified by other pressures.

The police officer often gets the feeling that no matter what actions he may take, there will always be someone to criticize them. Whether this criticism comes from a citizen or a courtroom, the police officer begins to develop a "police-against-everyone-else" attitude. This can be a considerable source of stress when the officer compares his feelings to words in the Law Enforcement Code of Ethics that state, "My fundamental duty is to serve mankind...and to respect the Constitutional rights of all men to liberty, equality, and justice...."

The process of alienating the police officer begins in the courtroom. Court appearances generally interfere with officers' work assignments, personal time, and even sleeping schedules. I can recall numerous times working all night and having to appear in court instead of going to bed. As I sat in the courtroom, I observed how the defense attorneys would approach the bailiff to ask him to call their cases first because they had other commitments. Meanwhile, I sat fighting to stay awake hour after hour. This lack of consideration by the courts is a common complaint among police officers I know. Finally when my case was called, the defense asked for a continuance to another day, or the defendant didn't show up at all. I knew then that I would get to repeat the procedure again another day. Of course, if I decided not to show up, the case would be thrown out. Then my supervisor would ask me to explain in writing why I wasn't there.

In the more serious cases, an officer can spend day after day in court for pretrial hearings and the trial itself. Most of this time is spent waiting to testify. When the officer takes the stand, his testimony will probably take fifteen minutes. And many times the judges, lawyers, and jurors who have spent days reviewing an officer's split-second decision will determine the officer made an error—the defendant's rights were violated and he walks free. Or perhaps the court will agree that the perpetrator was guilty—and what is his punishment? Once a month he will have to report to a probation officer. Meanwhile, the policeman may run into him again anytime—often during another arrest.

The public's idea of the role of the police officer and the actual performance of the job are very different, and this is another source of stress. Citizens' perceptions are often formed by information pieced together incompletely and inaccurately. Although the basic duties of fighting crime, safeguarding life and property, and enforcing the law are all part of the job, 80 percent of the time police officers are not dealing directly with criminal activity. Bernard L. Garmin, former police chief of Miami, Florida, explains the role conflict inherent in the profession:

Society expects much of the police and offers little in return.

History has left us a bewildering hodge-podge of contradictory roles that the police are expected to perform. We may ask, for example, are the police to be concerned with peacekeeping or crime fighting? The blind enforcers of the law or the discretionary agents of a benevolent government? Social workers with guns or gunmen in social work? Facilitators of social change or defenders of the "faith"? The enforcers of criminal law or society's legal trash bin? A social agency of last resort after 5 p.m. or mere watchmen for business and industries?⁹

A patrol officer must act as an enforcer and a peacemaker, mediator and executor, authority figure and public servant, and he must take into account social, economic, legal, and personal considerations. Inevitably the officer is caught in the middle of many disputes. Law enforcement officers must grapple with many of society's major problems—poverty, overcrowding, urban decay, drug and alcohol abuse, and domestic instability, to name a few. These problems defy simple solutions, and it is often all the police can do merely to contain them. Yet they are blamed for not doing enough to control the spiraling crime rate. Society expects much of the police and offers little in return.

A police officer's job often conflicts with his role as spouse or parent, or with other such responsibilities. Competing work and domestic schedules are a common problem. For the police officer who is also a parent it becomes extremely difficult to explain to a child why he can't be home on a holiday or why he has to miss the school play. Arthur Niederhoffer, a Ph.D. in sociology and a twenty-one-year member of the New



To most of society, crimes and victims have a way of getting reduced to printed matter in a news article. But to the police officer victims are very much real people.

York City Police Department, tells of the erosion of family life for one of his police friends:

For one couple, the work schedule cut them apart. Afraid to sleep alone, the wife could never adjust to her husband's late tours (midnight to 8 a.m.) Before every late tour, they reenacted the same domestic tableau. She insisted he drive her and their young child to her mother's house across town where they could spend the night. In the morning, the arduous safari reversed itself. This upheaval every third week [the officer worked rotating shifts] eroded their relationship until finally, the distraught husband made a last exodus to his mother-in-law's home, depositing his young family there permanently.¹⁰

Another strain on family life can be the police officer's inability to separate from his strong identification with his co-workers. The dress code, the regimentation, and the cohesive effects of shared danger and experiences combine to produce much solidarity among police officers. Anyone outside of police work, including the family, cannot understand this feeling of camaraderie. This condition often creates a void at home.

Moreover, the police officer develops certain behaviors to counteract job stress. Assertiveness is required of an officer, as he often has to take charge of chaotic situations in the field. Emotional detachment also becomes a defense mechanism to allow the officer to deal with the constant pain and suffering he encounters. The police officer is forced to view things such as abused children or mutilated bodies and consequently learns to be emotionally neutral for his own mental well-being. These behaviors are difficult to leave behind at work, and they may prove to be inappropriate in other roles such as spouse, parent, or neighbor.

To most of society, crimes and victims have a way of getting reduced to printed matter in a news article. To the police officer, however, victims are very much real people. The police experience emotional losses along with the physical ones. Add to this the internal frustration generated by the people they work for and the people they are expected to protect, and a situation results that can push even the most stable person to his emotional limits.

Policing isn't the most physically dangerous occupation, according to the insurance industry. Firefighting, agriculture, and mining are. The insurance companies, though, do not take into account the mental anguish, frustration, or broken lives that an occupation like law enforcement can bring. San Diego police Lieutenant John Morrison suggests that police are "walking the point" for society. "A few of us...know that there are some things you just can't do without suffering casualties—very literally and profoundly—and our job is one of them."¹¹

Notes

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³ John Stratton, "The Law Enforcement Family: Programs for Spouses," *F.B.I. Law Enforcement Bulletin*, March, 1976, 16.

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⁵ Goolkasian, Geddes, and DeJong, 7.

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Made in Ada: The NFL Ball

Claude Clayton Smith

Football-shaped nameplates mark the executive parking spaces at the Wilson Sporting Goods factory in Ada, Ohio. Inside the white cinderblock building a poster of Joe Theismann adorns the paneled waiting room wall. Back issues of *Sports Illustrated* dominate the magazines on the coffee table. I sign in with the receptionist and moments later am greeted by Steve Zuercher, the production superintendent, for a tour of the premises, to see how the official NFL ball—the one that Joe Theismann is about to pass in that poster on the wall, the football known the world over—is made right here in Ada.

"Are footballs really pigskin?" I ask Steve Zuercher.

"That's a myth," he says. "They say the early ball was a pig's bladder covered with cowhide. But I've never seen one."

Joe Horrigan, director of research information at the Pro Football Hall of Fame in Canton, agrees. "There is no historical basis for the football as a pigskin," he says. "Legend dates the ball to England in the 1600s, when field hands played soccer using stuffed animal bladders, most likely from a cow or goat."

"A myth," Steve Zuercher says again. He has just returned from an equipment show in Atlanta, a trip he makes annually to view the latest in sewing machines, laces, needles, threads—whatever might improve the operation in Ada. The show is hosted by the apparel industry, with displays by the same vendors that do business with Wilson. Zuercher is excited about one booth he saw which gave a demonstration of modular production. The workers were making garments, but the process could be applied to making footballs.

"Sounds like it's gonna be a good concept," Zuercher says. "It's where you have a group of five to ten people do the complete product—all the people can do all the jobs involved—instead of an assembly line like we have here. Modular produc-



Claude Clayton Smith is an associate professor of English at Ohio Northern University in Ada, Ohio—the home of the Wilson Sporting Goods factory where the NFL balls are made. "I first toured the plant with John Updike when he was in town for a reading several years ago. He later wrote to me, 'I'm still trying to find a way to write about it (the factory).' Since he hadn't, I decided to give it a try." Smith's most recent project is a screenplay based on his book Quarter-acre of Heartache, which is being considered for television and motion picture production.

tion increases quality and gives a group incentive. It just might be the way to go."

Other new ideas, like the computerized floor tracking system he saw, can be worked out in less time, say six to twelve months. The assembly line employees in Ada are on piece work. They keep track of what they turn out by attaching tickets as they proceed. But now there's a computerized bar coding system that checks out work like groceries in a supermarket. It will help with inventory, too. Zuercher has to determine if it's worth the time and effort to convert.

But he saw one machine in Atlanta that could be used in Ada right away. It would put a pricing bar code on each finished ball, so the retailer could put it directly on the shelf. At present a plastic bar coded tag—which the customer has to cut off—is tied to the laces of each ball by hand.

"Next year when we go to Atlanta all this stuff will be updated," Zuercher says. "There'll be new stamping and splitting and cutting machines. But we have to keep up. You never want to get complacent."

The Wilson factory is in its second year of a rolling five year contract for exclusive production of the NFL ball. It also produces 88 percent of all high school and college footballs. Closest competitors are Rawlings and Spalding.

What gives Wilson the edge? "Our people," Zuercher says without hesitation. "They're the best. In quality and experience. Come on. I'll show you."

But before we can get back into the factory a phone call interrupts, so I am turned over to Dick Price, the production supervisor, who hands me a pair of safety glasses and leads the way to the shop.

Hanging overhead by the time cards in the hallway of the employees' entrance is an enormous football, about ten times regulation size. As I gawk at it the hum of machinery fills my ears, a whirring noise punctuated by what sounds like riveting, then louder bursts that sound like a jackhammer, then blasts of air like the brakes on a bus.

"The founder of this business," Dick Price explains, "was Bill Sonnett, Sr. He brought the company to Ada from Cincinnati in 1938. It was originally the Ohio-Kentucky Manufacturing Company. Sonnett was looking for a rural community and somebody told him about Ada—nice quiet area, college town (Ohio Northern University)—it was ideal. Wilson bought him out in 1955."

Dick Price has worked at Wilson's for 26 years. His wife Peggy, who runs the die out machine which punches lace holes, has been here 23 years. Their daughter, Michele Price Smith, runs the machine that paints white stripes on the college and high school balls. She's been here 11 years. The dedication of the Prices is typical. More than 500 employee family members enjoyed the recent company picnic. You'd

never guess that the Wilson Company is a union shop. Management speaks highly of labor and labor speaks highly of management.

The high-ceilinged work area at the Ada plant is roughly the size and shape of a football field. We enter by the home team's bench. The stock room is the open area in the end zone to our far left. Four parallel lines of work stations run from left to right straight up the field, fed by conveyor belts that carry the work to 110 individuals. Three men in the stock room tend the belts, loading and unloading plastic bins the size of large laundry baskets. Larger bins—trucks on wheels—are pushed to work stations along the sidelines to cart off the finished balls. The plant is warm and clean, the workers dressed comfortably in jeans, khakis, and short sleeved shirts.

But what strikes you immediately is the activity—more than a hundred workers intent on their jobs, moving at a pace that is almost frantic. The place jumps with disciplined energy, the motions quick, animated, repetitive.

"We make 20 to 25 thousand balls a week," Dick Price says matter-of-factly. It's enough to make you dizzy.

The noise grows louder. The "riveting" is from the sewing machines, durable German-made industrial versions of the old Singer you might have at home. The "jackhammers" are actually pounders, machines that soften the tough leather seams of the football. These machines, as well as those that cut, stamp, and punch the leather, look like large drill presses. They operate under hydraulic pressure, hence the frequent blasts of air. Beyond them are other work tables where crucial steps in the production are done by hand.

"It all begins here," Dick Price continues. We are in the stock room, at a table piled high with steerhides. The leather comes from the stockyards near Chicago. Each hide is about six feet square, scalloped along the edges where it was cut above the legs, and again at the neck and rump. The thinner leather lies to the outside. It's used for the lesser grades of retail footballs. The best leather lies along the backbone. This is reserved for the NFL ball.

Natural leather is beige in color, but the hides on the table have been dyed and pebbled at the tannery. The dye makes the ball the reddish-brown color you see on TV. The pebbling produces the nubbled texture that makes it easier to grip. The Wilson operation consumes 40 to 50 thousand square feet of leather a week—ten times as much as its largest competitor. It takes two square feet of leather to make a single ball.

"The cutters have the real responsibility," Dick Price says as we start down the line. "Leather is expensive. They have to avoid waste."

The cutters work a flat football-shaped die across the steerhide, applying pressure from their hydraulic drill presses,

stamping out leather panels like cookies out of dough. Each ball consists of four such panels. Quality control workers check the cutting die weekly, to make sure its dimensions haven't changed. The finished ball must be at least 11 inches long, with a small circumference of 21 inches and a long circumference of 28. The NFL allows tolerances on these dimensions from a quarter to half an inch, because leather has a tendency to change with the weather.

The football-shaped panels are then color-matched by sight. Some are darker than others. Being a natural material, leather has its inconsistencies, so the dye doesn't always take evenly at the tannery. The matched panels are marked, stacked in fours beside the cutting machine, and sent to the stamper who, applying heat as well as hydraulic pressure, brands the Wilson logo into the leather along with the NFL insignia, plus any autographs or information that the NFL wants to place there. For the Super Bowl, the names of the competing teams are added to each ball in a special design. Once, ink was used, but today the gleaming logos are pressed in with colored foil.

The stamped panels are then sent to the splitter who feeds them through a machine with rollers—rather like a washing machine wringer—containing a thin horizontal blade. They come out as split grain. The beige, wrinkled matter that drops to the floor from beneath the pebbled surface of each panel is discarded at the landfill, although some manufacturers sell it as fertilizer. Split grain leather is used in retail products such as billfolds and jackets. Wilson uses it for the lesser grade footballs. The NFL and college balls are top grain missing the full force of the splitter's blade.

At this point the panels are weighed, the first of three quality control weight checks. The finished NFL product—spiraling through the air toward some receiver's outstretched hands—must weigh between 14 and 15 ounces.

"These are preliminary steps," Dick Price explains, although I'm already beginning to feel cut, stamped, and split by the noise. He has to shout to be heard. "The real strength of the ball is not in the leather. Leather likes to stretch. It's the lining that keeps the ball in shape. We used to use cotton liners, but now we use man-made nylon fabric. It's preshrunk and three-ply. There's no way it can change shape."

We move to the next station, where a woman is sewing linings to the underside of the football-shaped leather panels. The white linings, also football-shaped, resemble stiff gauze or muslin. The sewing machines on the assembly lines can run at 5000 rpm and produce up to 18 stitches per second. At that speed the needle smokes against the leather, cooling just enough as the operator stops to snip the thread and pick up the next piece. None of the sewing is freehand. The linings are placed flat against the panels then held against a gauge and



Barney Shields and Dick Price holding an NFL ball. Photo: Rob Tucker.

rotated as the needle runs the stitch. The operator has to place the work correctly and the machine does the rest.

For the lesser grade balls a nylon thread is used and the machine runs a continuous chain stitch. But for the NFL ball—"our Cadillac," Dick Price says—a braided Dacron thread is used with a lock stitch. With each stitch locked automatically in place, it's impossible for the thread to unravel.

"Ninety percent of our employees are women," Dick Price notes. "They're a lot more adept at sewing and lacing. But there are certain jobs they're just not strong enough to do. You'll see those later."

A large elderly man in a baseball cap passes by. "That's Barney Shields, the maintenance supervisor," Dick Price says. "He's our oldest employee. Worked here longer than anybody. I don't know what we're going to do when he retires. Barney put in all the plumbing and wiring. He's modified by hand most of the machinery we've got. He's a carpenter, a self-taught engineer—he's got this whole plant stored in his head."

Leaving the assembly line momentarily, we catch up to Barney Shields at the far end of the shop, where a few employees are taking a coffee break. At 67, Barney is as talkative as he's indispensable.

"I've been workin' for this outfit since February the 28th, 1942," he says proudly. "I started uptown—we had another plant in those days—turnin' baseball gloves at 27 1/2 cents an hour. I've been a receiving clerk, a shipping clerk, a

cutter. Done all the jobs except sewin' and lacin'. I came up through the ranks the hard way. Bill Sonnett, Sr., was my boss. He was quite a guy. If he ever had somethin' to say to you, he said it with a smile. But if you put a pipe down the wall, it'd better be perpendicular!"

"Any time we need anything around here," Dick Price chips in, "all we do is say, 'Hey, Barney!' He's made the bladder tables, the turning tables, the striping tables, the roll pounder. Our competitors would love to see some of Barney's inventions, but we don't allow photographs. The improvements aren't patented."

Barney Shields has no plans to retire—"They'd only be callin' me back anyway for one thing or another," he says—so for the time being his expertise is assured. But his ingenuity doesn't always make him happy. He's got an idea now for adapting a machine that would put a lot of employees out of work. The possibility bothers him, so he's leaving the idea "on the back burner."

A self-educated man, Barney Shields is an inspiration. In a world driven by high technology it's refreshing to know that some things—like the NFL ball—are a product of practical experience; that quality depends on craftsmanship. What the artisans of Ada produce is, in effect, a bona fide work of art.

I shake hands with Barney Shields and follow Dick Price back to the assembly line, to watch the lined panels sewn together to make a football. And what I see next amazes me.

Picture two football-shaped panels, one stamped *Wilson* the other stamped *NFL*. These are held flat together for stitching along the top edge, *the white linings facing out and the logos facing in*. The bottom two panels are similarly joined, lining out, pebbled grain to pebbled grain. Then, when the two half sections are sewn together, the deflated ball is actually *inside out*. At this point it looks like the stiff dry pith of some exotic, elongated fruit.

Given the thickness of full-grain leather and the stiff edges left by the cutter, the seams produced when the panels are sewn together are cumbersome and sharp. The ball is made inside out so that the seams can be pounded smooth. Otherwise, they would make the air bladder, inserted later, go flat. This "carcass"—as the ball is called at this point—will eventually be "turned," leaving the seams on the inside. It will be turned rightside out *by hand*.

Before that can be done, however, several steps intervene. Sixteen lace holes—8 to each side of the top seam—are punched into the leather and an opening is created through which the bladder will be inserted. An elongated oval flap is sewn to each side of the opening to protect the bladder from the laces. In addition, a hole is punched for the valve on the bladder. Then the ball is sent to the pounders.

The Wilson factory uses two types of pounders—a half-section roll pounder that Barney Shields invented, and a four-section pounder for the inside-out ball. Dick Price reminds me that films and photographs of the former are prohibited. Since 1000 words can make a picture, I focus my attention on the latter, a drill press type of machine that sounds like a jackhammer and pounds like one. The operator works the inside out carcass down over a mushroom-shaped pounding head through the opening where the laces will go. Then he works the seams of the ball around the head while the machine applies a blunt hammer-like tool from above. The rapidfire pounding is repeated until the seams are soft and smooth. Then the carcasses are tossed into a basket and the conveyor belt takes them up the line to the turning tables.

The turning operation requires brute strength, so the turners are all men. Each work table consists of a pounding head, where the seams are pounded again briefly with a mallet, and an upright turning bar on which the carcass is wrestled rightside out. Bolted upright, the turning bar resembles the floor shift of a pick-up truck. One of the turners, Charlie Moore, has been working at Wilson's for 25 years. He is slightly built but wiry, with wrists and forearms as tough as the full grain leather he handles. With quick, jerky movements he puts the full weight of his body behind each ball, twisting and turning the carcass about the turning bar. At times he seems to be breakdancing, at times he is doing ballet, and when he's done the carcass is rightside out, looking at last like a football.

Charlie Moore turns the sewed ball covers rightside-out—as many as 800 a day. Photo: Rob Tucker.



"Charlie's career was extended ten years by that steam box there," Dick Price says. "That's another one of Barney Shields' inventions. The men discovered it was easier to turn footballs in summer, because the heat and humidity soften the leather. So they talked with Barney and he came up with that box."

The steam box on the corner of Charlie Moore's table is like a kiln, about the size of a microwave oven. Each carcass is put in for a few seconds and comes out steaming. Charlie Moore hands me one. It feels hot, moist and pliable.

"The steam takes the physical strain out of the ball," he explains. "It softens the lining. It saves my hands. That steam box is a big deal on this assembly line."

Charlie Moore turns between 500 and 800 footballs a day—a strenuous effort. I ask him what he thinks about while working.

"Not much," he admits. "You can't stand and daydream. You gotta concentrate and watch what you're doing. You gotta keep the seams straight. Especially where they come together at the end of the ball."

He takes the carcass from me and slips it over the turning bar, and I follow Dick Price on up the line.

Women at the next station are inserting bladders into each carcass. The bladders for the NFL ball are made of butyl, the same synthetic rubber used in inner tubes and tires. The lesser grade footballs receive a bladder of urethane. Large fans blow across the bladder tables, drying the special glue that attaches the valve to each bladder. Once the bladder is inserted into the carcass, the operator pushes a pedal and a regulator inflates the ball to four pounds of pressure. Though still under-

*Michelle Burkett lacing the footballs.
Photo: Rob Tucker.*



inflated, it is easier to handle for the women who do the lacing.

Michelle Burkett, at the next station, has been lacing footballs at the Wilson factory for 13 years. Bent over the ball in her lap, she digs at it furiously. It looks like she's sewing up a stuffed turkey. Three fingers on each hand are wrapped with thick rings of adhesive tape, and her wrists are bound with elastic bandages for support. She uses an awl to push the two 29-inch white laces through the holes at the top of the ball, working one lace up, the other back down. She laces 300 footballs a day.

"The laces are made to look like leather," Dick Price explains, "but leather laces dry and crack. For the NFL ball we use a waterproof latex cover over a nylon filler. Actually, it's the stitching—not the lacing—that holds the ball together. As hard as it's kicked in the NFL, not one ball has ever come apart."

Michelle Burkett reaches for a pair of scissors, snips the lacing clean, and tosses the ball into the basket.

"Michelle's left-handed," Dick Price continues. "We almost didn't hire her, because the lacing pattern is designed to come to the right. She had to train herself, and she's done so well we now have three lefties on the line."

"I had a lot of pain in my right hand when I started," Michelle admits. "I don't think they knew I was left-handed. I took the whole end of my thumb off several times—not with the awl but with the scissors. Sometimes I look like I've been in a war zone."

As we move on, I ask Dick Price about job-related injuries.

"There aren't many," he says. "Oh, every once in a while somebody will put a needle through their finger and we'll have to take 'em to a local doctor and get it out. But it never gets more serious than that."

We follow the laced footballs to the next station, where they are put into a large cylinder that is molded inside to the shape of a football. Here, to stretch out the kinks, the balls are quickly inflated with 80 pounds of air, then the pressure is dropped to 13 pounds, the specified NFL pressure.

Since there are no stripes on the NFL ball—"The stadium lighting is so sophisticated there's no need," Dick Price says—we skip the next station, where a machine paints stripes on the college and high-school balls.

The inspection station lies ahead. Quality control. But en route we pass a table that makes me blink. It is piled high with "gimmick" products—footballs made of imitation crocodile skin, elephant skin, ostrich skin. Gaudy and tacky, they are nonetheless authentic footballs.

"We even have horned toad footballs," Dick Price says. "And several years ago we made a ball that was completely

orange. For a while it was our top seller. You never know what people will go for."

On this table too are the autographed footballs you can buy at the stadium, the players' signatures transferred by silk screen. "We put anything on the football the customer wants," Dick Price says. "We've made some with the picture of a cow on them and some with ice cream sundaes. A special logo is designed for the Super Bowl."

That's when things get hectic. Eight thousand new footballs are made for the Super Bowl—100 game balls, 200 practice balls, and 7000 balls for promotion and retail. Production begins on Sunday afternoon, as soon as the playoffs end. The competing teams begin practice on Tuesday afternoon, and the new balls—shipped *Tuesday morning*—are there. After such a spirited effort, as Greg Miller, the Wilson comptroller, attests, "You get a warm feeling when you see that ball on your television screen."

We reach the inspection tables and Dick Price tosses me a new ball. "This is it," he says. "Our Cadillac." It is shiny and slippery and exciting to hold. I cock it in my arm like Joe Theismann in that poster on the waiting room wall.

"The women at this station weigh the finished ball once again," Dick Price continues. "They check the length and diameter. They also do cosmetic checks, straightening laces and clipping threads. Then the balls are sorted. Only 20 percent will qualify as NFL game balls. They are as perfect as footballs can be. The next best are sold retail. You can buy one yourself at any good sporting goods store for about fifty dollars. Balls with blemishes ("blems") are sold as seconds."

At the packing area, as a courtesy to store owners, a theft-proof nylon tie for the price tag is attached through the laces. Then the retail balls are placed in an open-face box—an attractive orange "display carrier" marked *Wilson*—because customers like to be able to touch the ball in the store. Those destined for the NFL are packed in plastic bags within a simpler box. To prevent theft, there are no identifiable markings on the large packing boxes that carry the balls by the hundreds from the plant.

"There you have it," Dick Price says. We are at the employees' entrance once again, the home team's bench.

I look back along the assembly line. It is 11:00 a.m. We began our tour at 9:00. The frantic pace has not lessened, the machinery still whirs—the riveting, the pounding, the air brakes. The herky-jerky turners at their tables.

Kickoff time is 6:00 a.m. daily at the Wilson plant in Ada, sending the NFL ball your way. ■

Prose Poems: Four Fish

Lynn Luria-Sukenick

Catfish

With my whiskers swept back I suck along the sandy ledge, an appetite that eats the ooze of things and tin cans and thimbles. I rest on the smooth river bottom that's like a squirming mouth of mud under your feet. I'm loaded with dead food and I'll hang like a dead thing on the line and swallow the line and your hand and a tin can and a thimble. My tiny cousin hunkers in blue gravel, barbels touching the sides of the fishtank: it's lonely to be looked at clearly when you're used to murk. In *Trash and Gravel Magazine* I read: "a scavenger's an anthology," and "'Catfish' in Latin means 'Refuse nothing.'" We're sickening, yes, but to you, not to us. You'd eat us *twice* if everything you trust were gone from your life. You think you've hit bottom? If we're not there, you haven't hit bottom.

Anyfish

Time treats us differently. You're bolted down to summer and winter in your lamby world. Here, dark water's least light looks for time's blessing. Whereas you, sunk into portions, keep time in a glare of separateness. True, we are one-by-one, we fish, for on the ocean's one day off it let us happen, us too, portion by portion. But how we've been since It Was is too wet for time to follow, and the ocean, not knowing it's late, waits up, later and later, for *tick*, for *tock* to enter and number its dark world.

Lake Whitefish

On the placemat at your favorite fish restaurant I'm right next to the tiger shark whose teeth renew to a thousand in ten years. It's a bottom view of him and he looks so blank and sightless, better not panic or be naked. With teeth like that he doesn't need to be liked, and I don't mean sharp, I mean teeth that keep growing. I'm white too, but toothless, a pout that's all wet lips and eyes, a guppy who's had her Sunday spoiled. On my left the rainbow trout's so fast he makes my pallor ache with the showy streaks of pink he got from sunsets he's seen on his leaps. He's bragging in gold and pink, whereas I worship the true blue, something you don't have to *have* or have the nerve to have.

Yellow Perch

Yellow perch don't perch, we angle not to be caught. Men think it's good to find our yellow deep in the black and green. In schoolbooks the Great Lakes are places you can memorize without a visit. The only way a fish can visit is seined into a phony lake to be taken easily in the suburbs in a weird surprise, like a soldier dying after a truce. We are the true fish because humans say so. Our hell is a wall of pine and stuffing where our guts were. Guts gone, we aren't less true, we're art, we're art after sport, but not alive in the grace of fresh lakewater that God gave.

A native of New York City, Lynn Luria-Sukenick now teaches creative writing at San Diego State University in California. She has also worked with migrant workers and the poets-in-the-schools program, and had a private practice in writing and healing. The Cleveland State University Poetry Center published her book Houdini Houdini in 1983, and she was Poet in Residence there in 1989. "I write most of my poetry in my fiction now, but once a year for a few weeks, poems pass through like birds on a migratory path. These prose poems about fish were written in Ocean City, New Jersey."

Four Poems: Blood Music

Lee Crawley Kirk

May Be Crazy, We

Crazy, we. Crazy they say.
They who live in hollow boxes
eat cornflakes three times a day
put water on grass
put grass in garbage bags
chew too many bones. We crazy
say they. Make too many
strange noises, walk too much
in strange places, see too much
moon. Like rocks. Like warm
love. Like good cold water.

Rocks love we, too. Hold rock,
it speak of living in water,
talk about wind. Tell about squeezing
and changing, like being in love.
Good smooth rocks, rocks with
holes, hot rocks, broken rocks.
Each rock have moods.
We like fish, too, and beetles
crawling under plantain leaves
and little snakes under stairs
and bees sitting on edge of
dandelions, and one mourning dove
standing alone in road.
We crazy, like strange things.
We ugly, say they, like toad.

May be toadlike: hop. Hop.
Don't care if crazy: like moon,
like rocks. Like strange. Like love.
Like beetles and bees.
May be crazy: like this poem. Hop.

Too Small To Hold Animal

We be all twisted up, we.
We be confused, turned
outside in. We float on bottom
of water turned up. We rest on sky,
watch ground roll over us.
We sniff animals.
Animals sniff we.
We being not animal, we
being too warm for animal
too confused for animal.
Animal be we. Bear hurts paws
on we. Eagle break wings.
Coyote die of broken heart.
We be too big for animal,
too small to hold animal,
animal run away from we.
Like animal we whine,
make moon make promise,
ask moon to lose we
in mud by dark river,
beg moon take heart out of we
sacrifice heart like
heart of animal, let coyote
eat heart so he not be dead
again, give heart to bear
to make strong again, leave
heart for eagle to carry
in strong hard feet
somewhere by dark river,
drop heart like small white stone
into mud for animal to find.
We be much too small for animal.

Bless Animal

Sometimes we hurt. Sometimes
deep down inside of we, old
animal grumble and groan.

Sometimes blood in we not sing
but burn, turn hot in we.
Some other touch we, we touch,
make blood burn
make old animal grumble,
moan animal noise, move restless.
Old animal bash we,
hurt all soft things inside,
dig hard with claws, push
nose where it not belong.

That old animal pretty smart
sometimes. Know more than we
about we. Know more about
feeling, being, about blood
turning hot. Poor we,
old skin and bone thing,
poor old thing turned too much
to inside head, listening to
music inside head, forget how
other can make different music,
make music in small, soft parts,
make things hot. Animal knows.
Bless animal: animal knows.

Animal Growing Round

Animal become content.
We watch moon grow full
then small again. Weak moon wobble
in sky like animal all lean with hunger.

We not be hungry though.
We be animal growing round
with fullness. We watch moon with wonder,
watch moon grow away to skinny grin
make we grin knowing how full we be.
Stars sing madly, weaving madness in we,
warning we that fullness
not last forever. That okay, say we.
Someday when we be
lean and hungry again,
we suck on memory of fullness
like holding smooth old stone in mouth.
Taste last even when content be gone.

Not worry about then, now:
like now for all it be.
Letting now be most it can,
animal will know its fullness
someday, may be.

"As a child," says Lee Crawley Kirk, "while other little girls spoke of becoming a teacher or a nurse, I dreamed of becoming a cowboy or a railroad engineer. Older, I wanted to be an archaeologist, a pianist, or a zoologist specializing in ungulates. But through all that I wanted to be a writer." Lee Crawley Kirk lives in Eugene, Oregon and after being a bookkeeper, an antique store owner, an adult education teacher, and a goat- and chicken-farmer, she currently supports herself as a full-time freelance writer and reviewer. "In the 'Blood Song' poems, the 'we' persona might be described as the awareness of spiritual essence. It is part human, part mammal, part bird, part fish; it is plant and rock and wind and water."

French Supermarkets: Worshipping Food French Style

Pattie Hainer

Two elderly farm women in heavy black dresses and thick stockings bend over a pile of fabric pieces, comparing notes on colors and prices. A middle-aged, stocky man speaks earnestly to a young woman with a baby carriage while he gestures to a selection of T-shirts spread out before him. Shoppers balance baskets on their arms and skirt plants and vases of flowers that encroach on the sidewalk. The cackle of chickens rises raucously above the call of vendors hawking their wares.

Posters and tour guides have made these scenes of France's open-air markets all too familiar to foreign visitors, but there is another world of French shopping not seen in its picturesque travel brochures. More and more, the French are seeking lowest price and highest convenience in gargantuan *hypermarchés*—one-stop discount clothing, appliance, and food markets. These giant stores, the feature attraction in *centres commerciaux*, the French equivalent of shopping malls, are different from their U.S. counterparts in size, selection and convenience. One such French market claims to have three times the floor space of Notre Dame in Paris.

At the Rallye Hypermarché in Quimper, Brittany, shopping convenience starts in the parking lot as some centers offer full service gas stations. Cars can be washed, repaired, or fueled, before, during, or after shopping. If repair service is not available, gas is, always. Last stop before heading home often is the gas pump located at the parking lot exit. Convenience continues on the way to the market with specialty stores, particularly cleaners that provide one-hour service as their employees clean and press on the premises while shoppers go about their business. Letters or packages can be mailed or bulletin boards, information lines, and mail-order



Pattie Hainer, who works as a journalist, was born in Boston and now lives in Norwell, Massachusetts. For a year she and her husband, an anthropologist, lived in Brittany, where their sons, now fifteen and nine, attended the rural French schools, and where Hainer "marvelled at the efficiency and convenience of French shopping centers." Photo: Peter Hainer.

enterprises accessed through a Minitel terminal, France's national computer network, all at the center's mini post office.

Once inside the cavernous market, watch out! Cart traffic whizzes by at the speed of a European autoroute. "You better look both ways before crossing an aisle here," whispers an awed tourist. It pays to drive cautiously too since at some stores it is necessary to rent the shopping cart. Locked together in a *chariot* station in the parking lot, they are released with the deposit of a ten franc coin (about \$1.75 at the current exchange rate) into a coin box at the side. Damage from careless driving may prevent proper reinstallation and retrieval of the coin. At the turnstile entrance to the market itself, a long row of shelves, holding the week's specials, funnels shoppers past a gauntlet of washers, dryers, garden tools, building and auto supplies, books, stationery, and household goods, toys, musical instruments, and overcoats, none of which offer any great surprise to the American shopper other than the fact that it is part of one gigantic supermarket. But straight ahead, at the beginning of the food department, a display of twenty-nine different types of bread, freshly baked on the premises, inspires interest. Displayed in baskets sized to match their shapes, long, thin baguettes, brick-shaped whole-grain loaves, heavy rounds of rye, they are but a modest introduction to the irresistible, a bowling-alley array of mouthwatering pastries: fruited tarts, creamy tortes, custard *éclairs*, cakes, rich and luscious, mounded high with whipped cream or lying low, covered with smooth, glassy chocolate. All of them are encased in hard transparent plastic boxes, ready to withstand the crush of fruits and vegetables picked up further ahead.

On the way to the produce department, an easy detour to the left leads to sweatshirts, sheets, shoes, bright blue work uniforms, and sports equipment. Like the sports equipment and clothes, the fresh fruits and vegetables are disappointingly limited to in-season choices. Out-of-season fruits and vegetables are hard to come by in France and, when available, are exorbitantly priced. *Haricots verts*, France's long skinny version of the string bean, triple in price from August, when they are in season and cost \$1 a pound, to December. Exotic specialties that have become commonplace in many American markets, hot peppers, bean sprouts, pea pods, wild mushrooms, are rarely available here. December sees the shelves crowded with winter leeks, potatoes, cauliflower, and 15-cents-a-pound carrots, often covered with a generous portion of the sand from which they were harvested. Hard, tangy onions with long green stems, small new potatoes, and sweet, delicious strawberries from Brittany's Plougastel Peninsula announce the arrival of spring. Summer brings the standard bounty of reasonably priced zucchini, tomatoes, and eggplants. If produce selection is limited, quality and good taste are not. Fruits and vegetables are crisply fresh and flavorful if



Choosing bread at the hypermarket.

not always flawless. The French much prefer good taste to good looks in their food, and apparently good health as well, since signs for each item indicate not only price but also the name of any chemical with which it has been treated.

Whatever the choice, customers bag their purchases in the same thin plastic sacks common in the U.S. and weigh and price them on computerized scales that turn out a sticky bar-code label.

Any deficiencies in produce selection are well compensated elsewhere; the range of choices almost defies description. The poultry case alone offers the makings of an elaborate gourmet feast: skinned rabbits, wholes, halves or pieces; quail, six to a box, lined up like miniature chickens with intact heads peeping through their wings; pheasant, goose, turkey, duck, and chicken, whole or in parts, fresh or smoked, confitted, terrined, or patéed, with sauce or without. Barbary duck on sale at \$2.50 a pound is cheaper than hamburger at \$3.50. Not all of the birds are found in the food cases. Occasionally, an errant sparrow or two flies through the vast rafters, stopping briefly to perch on the canned goods or cereal cartons.

Refrigerated display cases hold meats and charcuterie: racks and racks of sausages, linked or sliced; livers of chickens, cows, geese or ducks; kidneys; hams cooked a dozen different ways, whole, pieced or sliced; tongue, big ones from cows or little ones from pigs; veal, beef, and pork, including a ready-to-eat whole head of pig sprouting parsley from its smooth brown snout, squinting through a layer of Saran

Wrap; any and all parts of every species. In France, even the dogs eat well: one whole section of the meat case is devoted to fresh ground meat for dogs. For the very fussy, *cuisine au naturel sans colorant*, with no artificial color or flavors, can be had for \$2 a pound.

In a rush? Take your pick from the wrapped and ready-to-go fast food case featuring a full complement of international delicacies: paella from Basque country; couscous from Algeria; coq au vin; squid salad; tongue of beef madeira in mushroom sauce for \$7 a pound; blinis; Vietnamese spring rolls; escargots, frozen, fresh or canned; pizza; quiche Lorraine; coquilles St. Jacques; langoustines, lobster, or crabs, with or without the shell, creamed or chopped; and everything garnished with swirls of mayo, tomato wedges, parsley sprigs and lettuce. Another long aisle offers plastic pouches of one-dish, one-person meals, hanging like packaged socks or rubber gloves, waiting to be plucked and plunged into boiling water before serving.

France produces over 365 varieties of cheese, making possible a different one for each day of the year, and any one hypermarket offers an ample selection, including those unique to the region, either from the farm or the factory, bulk, fresh, cut-to-order or prepackaged. Other dairy products abound: yogurt, every brand, size and flavor, low fat or no fat; creams, butters, and puddings, and shrink-wrapped packages of six, one-liter boxes of Ultra High Temperature milk that keeps up to six months unopened without refrigeration. More than the contents, the milk packaging itself is curious to Americans: cardboard boxes lined with aluminum whose corners must be cut with scissors; flexible plastic liter bottles or, more interestingly, paper-thin plastic tubes, stored on their sides.

Almost every product available fresh, frozen, or ready-cooked also comes in cans: soup, stew, duck or goose, meat and livers, salads and vegetables; and if any are missing a price tag, monitors placed throughout the store scan the bar code and display the price. Quantity prices for most items are posted on the shelves. Sometimes these are reliable, sometimes not. Package labels indicate the percentage of major ingredients in each dish.

Few frozen-food items are available. The large refrigerators and freezers that are standard equipment in American households are still a luxury in France. For those who do have the space, a comprehensive selection of frozen foods is offered in small specialty stores that sell nothing but frozen food. Some frozen food factories sell door-to-door.

If fresh, frozen, or canned is not to your taste, try smoked or dried, from fish to sausages. Slabs of imported smoked salmon can be had for \$25 a pound. Caviar? Take your pick from three different kinds. Perhaps something more pedestrian? Among the skate wings, eels, and squid rest the more ordi-



Ready-to-go pig's head and packaged quail.

nary fillets resembling sole, haddock, and cod with a French accent: *lotte, cabillaud, anon, limande*.

Who could eat a meal in France without wine? Choose from reds, whites, rosés and bubbly, in gallon-sized cardboard boxes or plastic dispensers, single, glass-bottle liters, or half-liters. Having a party? Take a six-pack, ringed with plastic, like beer. There's even plenty of that. Four aisles worth of wine and beer. Four long aisles. Even so, there are a few things missing: peanut butter, although peanuts shelled and unshelled are plentiful; Italian cheeses; the staggering assortment of cereals that Americans are used to; and frozen orange juice. It comes, instead, reconstituted in cardboard cartons or glass bottles at a premium price.

All this and speedy checkout too. Customers ease into any one of the fast-moving lines at a bank of forty or more registers and place their food, clothing, and appliance purchases in front of a cashier, comfortably seated on a padded swivel stool, who whisks everything across a silent scanner and into an automated bagging device. When the bag reaches a certain weight it disengages from its metal frame and slides down a short conveyor belt where the customer picks it up and puts it in the shopping cart. A customer, typically prepared to provide her own bags and do her own bagging, was observed exclaiming, "Oh la la," and clapping her hands in delight when she first saw the new gadget.



Speedy checkout.

Payment is speeded up too. Registers automatically imprint the name of the store and the total of all purchases on either a personal check or a credit card form, requiring the customer to provide only a signature. If you have purchased a gift for someone, a request at the service desk will yield a free generous sheet of tasteful, high-quality wrapping paper. "*C'est gratuit, Madame,*" the clerk explains, smiling.

If all this sound tempting to American consumers, they may soon have a chance to try one of these markets. Carrefour, a chain of French *hypermarchés*, which opened France's first in 1963, has opened one in Philadelphia and one in Cincinnati. Before long, other Americans are likely to be worshipping food, French style, in cathedral-sized hypermarkets. ■

Hometown Heroism

Volunteers needed

Ken Roby

It is four o'clock in the morning, and you are sleeping quietly in a warm bed.

It is Christmas Eve, and you are spending a long-awaited evening with loved ones.

It is New Year's Eve, only a few minutes to midnight.

It is any day of the year, any time of the day, any time of the night.

With sudden sharpness, a shrill tone sounds—the pager on your hip, making your heart jump as your body goes into overdrive: FIRE CALL!

The town of Chagrin Falls seems to explode when the pagers go off and many of its more than fifty volunteer firefighters converge on the fire station. In a matter of seconds, each member of the first-in team dons some \$2,000 worth of protective equipment (often called turnout gear by firefighters). The first Mack pumper rolls out the bay doors with eye-popping red and white lights, sirens, and an air horn that makes your ribs vibrate. Two of the firefighters riding backwards in the jump cab slip their arms through the straps of their air packs and lean forward, pulling the air cylinders out of their brackets with a metallic clang. The thunder of the midship diesel engine is loud enough that the firefighters ride in silence until they reach the scene.

The second-out Mack follows quickly after the first, stinging the air with its strobe lights and rasping the windows with its horn and sirens. Truck follows truck, until all the designated apparatus has responded. Additional firefighters stand by at the station, prepared to answer a second call or to back up the first-in teams if more equipment or manpower is needed. In one form or another, this is the life of volunteer firefighters all across the country, as it has been mine since I joined the Chagrin Falls Fire Department in 1980. I have never regretted it.

Firefighting is at once a glorious and a heartbreaking endeavor. It is perhaps every boy's dream, at one time or



Ken Roby has lived most of his life in Chagrin Falls, Ohio. He works as a farrier (horseshoer) and general blacksmith, inventor, and freelance writer. He joined the Chagrin Falls Fire Department in 1980, and has been responding to his beeper ever since. Smithing appears to run in his family: he has a cousin in England who is both a farrier and a volunteer fireman; one of his great-great-grandfathers was a blacksmith during the Civil War.

another, to be a fireman. The shiny trucks, the ideal of bravery and heroism, are wonderful to a child—and still are to those of us who have chosen to make a part of our lives the camaraderie of other firefighters and the mechanical behemoths that are our constant allies. But the reality of firefighting is very different: every year, most of us see more than enough fire, blood, and tears. Crouching in six inches of putrid water and ash, searching with swollen fingers for the incinerated remains of an elderly woman can cast a grim shadow on one's job.

The swiftness and totality of the many tragedies witnessed by firefighters drive home to them the fragility of our lives; yet even with this grim awareness—or perhaps because of it—firefighters continue to risk their own lives daily to save others.

With smoke, steam, and the mist of his own breath fogging his face mask, a firefighter must listen and feel to find his way through a burning building. Firefighters often train with their face masks taped over, simulating the blindness one experiences in a real fire. A firefighter must learn to feel the floor underneath him to know that it won't give way, and that he won't go tumbling into a fiery abyss like so many of his brothers before him. He hopes the ceiling which he cannot see above him will not come caving in on top of him. And he prays that the water in his heavy and unforgiving hose line will not fail him at the instant he needs it. He hopes that the superheated smoke and gases inches above his head will not flash over and burn him to death right where he is crawling on his belly. This is the environment of a firefighter's work.

But a firefighter's work is not always so extraordinary. Often he must sit patiently for hours, waiting and watching, for a potentially hazardous situation to be resolved: hazardous material spills, bomb threats, downed power lines and similar incidents require us to stand by for many hours.

And, unfortunately, the firefighter must often learn to deal with an uninformed and unconcerned public. Most people simply do not understand the techniques of fire suppression, and often perceive life-and-property-saving measures such as ventilation and overhaul as wanton destruction. Firefighters must ventilate a burning building before a fire can be safely and properly extinguished. If a fire has not vented itself through windows and other openings and is not free burning, it may create an incredibly dangerous, potentially explosive, situation. Under certain conditions, should a door be opened and oxygen admitted to the fire before it has been ventilated, the resulting explosion can blow a house apart with the force of a bomb. Firefighters must open a hole above the fire to let gases out before the fire itself can be attacked. To the uninformed bystander, the fire department is not doing its job because they are too busy cutting holes in the

roof or breaking out windows. But the firefighters know they *are* fighting the fire—in fact, they are fighting for their lives as well.

Firefighting itself is usually a relatively brief procedure, but overhaul after the fire may take many hours or even days. The overhaul stage is also often mistaken for unnecessary destruction, but again it is an important part of the whole firefighting process. Because fire often finds its way into walls and spreads throughout a building, wall and ceiling coverings must be removed until every trace of the fire is extinguished; otherwise it may easily rekindle. Overhaul is also a deceptively hazardous procedure. Ceilings, walls, or floors weakened by the fire or the weight of water often collapse. Toxic gases produced during the fire are now cooling and settling back down over the firefighters, some of whom may have removed their air packs after the fire was out, unaware of the silent death enveloping them.

Because of the severity of the environment in which the firefighters must work, and the extreme danger of many situations, their tools and equipment are of the utmost importance. Protective clothing and breathing apparatus are among the most important: they are often the only barrier between the firefighter and injury or death. Contrary to popular misconception, turnout gear for the firefighter does not consist of boots and a heavy duty raincoat. His gear is a system of equipment designed to keep him alive by protecting him from heat, fire, superheated gases, and physical trauma. Turn-out coats and bunker pants are normally made in three layers: a protective outer shell of Nomex, Pbi, or Pbi/Kevlar (fire resistant materials), a vapor barrier to keep him from being scalded by steam and gases, and a thermal liner for protection against the intense heat of a burning building. A complete set of gear—including turnout coat, bunker pants, bunker boots with steel shanks and toes, Nomex or Pbi hoods, special leather and/or Kevlar gloves, and composite or Kevlar helmets—is bulky and expensive. But no firefighter can afford to be without them.

The Self Contained Breathing Apparatus (SCBA) protects the firefighter's respiratory system by providing cool, clean breathing air (not oxygen as commonly thought). Without it, a firefighter would die in a matter of minutes or even seconds. It is obviously imperative that the SCBA work flawlessly during firefighting procedures.

A recent innovation is the Personal Safety Device, now used by many departments. This device is worn by the firefighter and sounds an ear-piercing 95 decibel alarm if the firefighter goes down. It is essentially a motion sensor which activates if the firefighter remains relatively motionless for more than about 20 seconds. These devices cost up to about \$150 each, but are fast gaining popularity.

It can thus cost well over \$2000 to outfit each firefighter with proper turnout gear and SCBA: no small financial burden for many fire departments, but a life-and-death necessity.

Other tools consist of everything from screwdrivers and pliers to axes, special saws, and hydraulic rescue tools capable of ripping an automobile into pieces. Firefighters' ladders, though similar in appearance to ordinary ladders, are designed to handle the extreme loads and abuses of the fire service. Nozzles are complex tools that can cost hundreds of dollars each, but are designed to deliver specific types of streams which are critical to safe and efficient fire suppres-



The author in his turnout gear.

sion. Portable pumps, generators, lights, communication equipment and networks, mutual aid systems, aerial ladders, tankers, pumpers, heavy rescue equipment, and the vast variety of other tools and equipment must all work together at the right time for safe and successful fire control. This requires a lot of training, financial backing, and dedication. But in the end, it all comes down to one thing: saving lives.

Firefighters are called upon to handle all types of emergencies: vehicle extrication, rescues, hazardous material incidents, bomb threats, and, yes, stranded animals. But where do these firefighters come from? Who would want to give so much time, energy, and occasionally their lives to do this work?

An estimated 85 to 90 percent of fire departments in the United States are staffed by volunteers who fill the fire, rescue, and emergency medical service needs of communities, both rural and urban. Full-time, professional fire departments are not cost effective for many communities. Because of budget limitations, professional fire departments may have limited manpower and equipment, while a neighboring volunteer fire department may have several times the number of available firefighters and possibly better, more modern equipment. Though not immune to politics, volunteer fire departments are often, by their nature, more flexible and better able to adapt to changing technology and firefighting tactics than their full-time counterparts, which may be hampered by bureaucratic machinery.

But things aren't all peaches and cream for volunteer fire departments either: as people become busier and our lives become more complicated, fewer and fewer people can find the time to dedicate to volunteer firefighting. Much training is required both by the government and by individual departments for those who want to serve.

In the state of Ohio, those wishing to become volunteer firefighters must be at least eighteen years old, and must complete a State Trade and Industrial Educational Services thirty-six-hour basic course. This course covers the fundamentals of firefighting: tools, equipment, hose and hose loads, extinguishment, overhaul, ventilation, search and rescue, firefighter safety, and other important topics. Most if not all of the training received by firefighters is provided by their department, or by a neighboring department.

Most volunteer firefighters eventually complete an advanced fire service training, and many continue to attend the numerous courses presented around the country. The opportunities for improvement are endless, because the situations and hazards faced by firefighters are complex, and no two are alike. As more diverse and dangerous new hazards are created by our technology, the need for more training becomes evident. State and federally mandated minimum training requirements for various duties demand more time. It is

easy to see that volunteer firefighters are required to devote a considerable part of their lives to their service.

But it is critically important that firefighters understand the dangers they face with even the most mundane or routine calls, which can easily become disastrous or fatal. A poster in many stations sums it up: "Every day 250 firefighters are killed or injured in the line of duty. See you tomorrow?"

Some volunteer fire departments are at present experiencing a shortage of recruits, a situation that is easy to understand. Our society pushes people toward an "it's not my problem" attitude. But, as one who knows what it's like, I would urge anyone even faintly attracted to firefighting to consider volunteering in his or her community. The pay for volunteer firefighters is low, or nonexistent. Some departments have people who man the station for a nominal sum. Others pay the firefighters a per-call fee, ranging from \$1 to \$10. The fire departments do however provide serious insurance for any on-duty injury, and some have other benefits such as PERS or a pension fund. But no one goes into firefighting for the money. For me the action, the camaraderie, and the sense of performing a vital service for the community by far outweigh the inconvenience and personal risk. ■



Mother and Child, Paris


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