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Season's Greetings

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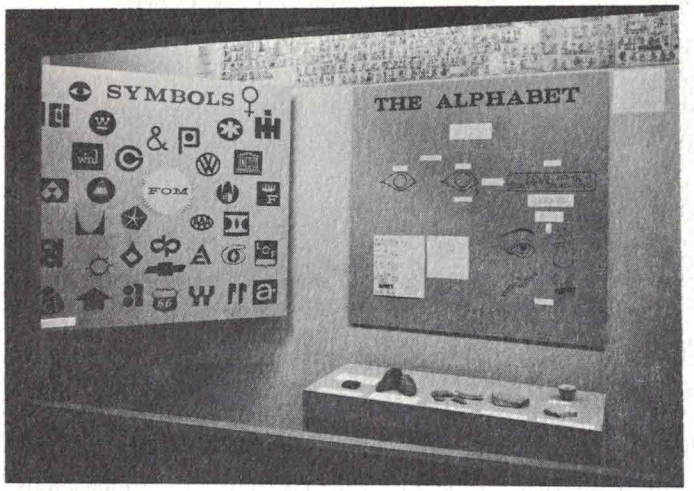
be traced today. We can follow its spread through its member languages. The first migrant group brought the Indo-European speaking Hittites to Asia Minor. Soon after, another group introduced the language to Persia where it formed an Indo-Iranian sub-family spreading as far east as northern India, where its oldest known member, Sanskrit, and the modern languages of India represent it. In Europe, Indo-European reached into the Balkans and Greece, then into Italy where it spread and produced the Romance languages of southern Europe. A Celtic branch pushed to the Atlantic and the British Isles, while the Balto-Slavic group remained near its original home. The Germanic arm, represented by the Scandinavian, German, and Lowland speech as well as English, spread over the northern and western part of Europe, Britain, and eventually most of North America. Very dramatically, the pressure of the growing hordes of barbarians of the plains and steppes of the central and southern Eurasian continent is revealed through the history of the impact of their languages on the peoples they overcame and displaced. Two other language families, the Semitic of the Near East and the Hamitic of northern Africa, also had great influence on the history of Western culture.

The components of all languages are sound (phonetics), sense (vocabulary), and structure (grammar). It is the difference in sound which makes it difficult for us to speak a foreign language like a native, for we are attuned to the sounds of our native language by habit. All peoples do not make the same noises in speech. Listening to an infant trying out and enjoying his vocal capacities, one can understand that he is capable of producing many sounds that do not occur in the language he will eventually speak. Imposed habit will in time tune out the extraneous sounds and he will forget how to make them. These speech sounds are applied to vocabulary, the vast list of vocal symbols which stand for objects, actions, states of being, and feelings. Grammar is the order in which the symbols standing for words are arranged for communication. These compositions of speech vary almost infinitely among the world's languages. The parts of speech important in some languages are blithely ignored in others. Inflections, genders, number, tense, and many other elements that comprise speech are dealt with in a serenely tyrannical manner. Each of us, in our own language, learns to follow the accepted "rules" so automatically we seldom think about them until we attempt to learn a new language with a different set of rules.

Basically, the symbols of language are created by need and desire, but they are merely reflections, tools that join any two human beings together for a brief communion. In this way language is a bridge, but it can also be a barrier to communication because of its diversity. It is also the instrument on which thinking is built, the means by which thoughts, actions, feelings, and ideas are manipulated into cultural advantages.

Writing

Man's communication needs were satisfied by gesture and tongue while he lived in small hunting and food-gathering communities. However, situations must have arisen when he felt a need to send messages to fellow-tribesmen who were not present. "Here is a fine fishing spot." "Be careful

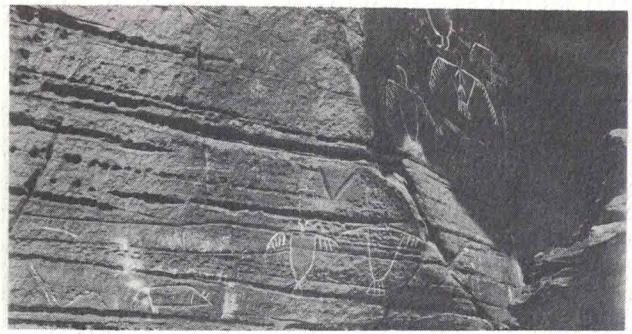


Section of Milwaukee Public Museum Exhibit Showing Modern Signs and Symbols and the Rebus Method of Transferring Pictures into Phonetic Elements

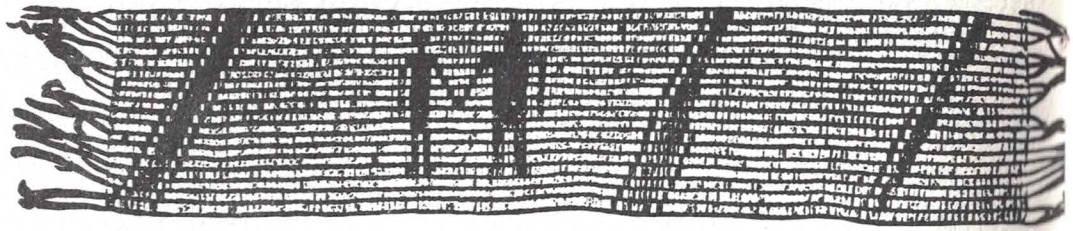
of the crumbling walk on the mountain path." "Bring help! I have found more deer than I can carry." As civilization became more complex, it must have become necessary to have records of numbers of things—time, property, recurring events. "We will plant when the moon is full in fourteen days." "The temple received twenty cows from John Stone-ax." How did man deal with these problems? Some idea can be obtained from observing primitive peoples today. Early man has also left behind evidences which give some clues.

Whether from a desire to express himself esthetically, or from a need to propitiate the gods with a sort of magic or religious representation of familiar creatures of the hunt, or to commemorate some special event, early man painted or engraved pictures and signs on rock. Before writing, he used memory aids (mnemonic devices) — notched sticks and bones, knotted cords, bent twigs and sapling trees, beads and shells strung in significant patterns—as a means of giving messages. As a storyteller, primitive man's way of transmitting his history and culture to the young, he used pictures and other devices to remind himself of the order of the events he was reciting. He also found it necessary to relate property to owners. For this purpose property marks and manufacturer's stamps were invented. Through the ages these have developed into what we recognize today as seals, crests, coats-of-arms, brands, and trademarks. In fact, pre-writing symbols are still used as adjuncts to present-day writing in practically every aspect of everyday living and record keeping. A glance at any good dictionary will show how extensively they are used.

The first true writing system appeared in the tourth millenium betore Christ, a little more than 5000 years ago, in the region of the Tigris and Euphrates Rivers in ancient Mesopotamia. This does not mean that writing evolved continuously from that time. It is believed that the idea of writing generally spread by contact: that is, peoples heard that somebody had a method of sending messages or leaving information by making marks on certain materials, and thinking this a useful thing, they then set



Petroglyphs Found at Twin Bluffs, Juneau County, Wisconsin

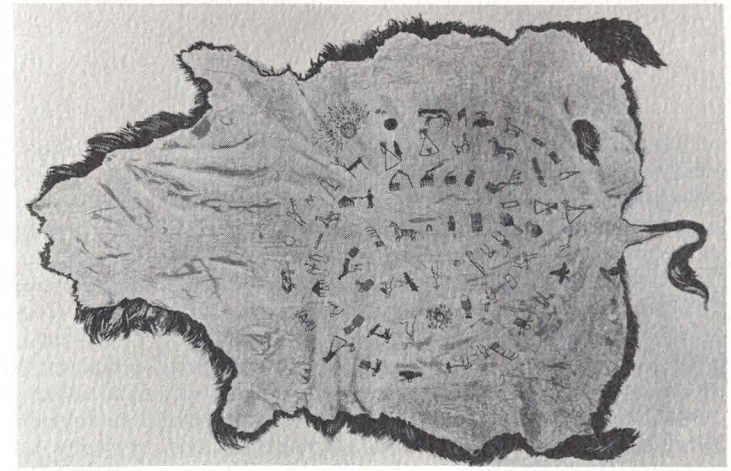


Wampum Belt Commemorating the Penn Treaty

about inventing marks for their own languages which served the same purpose. In this way, writing had many beginnings in many places. Each system, like each language it represents, is quite unique.

The ancient peoples had a superstitious awe of writing, probably because in the beginning it was used by the priests in the temples for record keeping. They usually attributed its invention to a god or folk hero. The Babylonians considered Nebo, their god of learning, as the inventor of cuneiform writing. The Egyptians gave credit to Thoth, and the ibis-headed figure is always pictured with a reed brush and ink palette in his hands. For the Chinese, the dragon-faced, four-eyed Ts'ang is the inventor of their characters, taking his inspiration from the patterns of the stars, the marks on the back of the turtle and the footprints of birds. In India, the Hindu god Brahma was supposed to have invented letters in order to write down his teachings, his patterns coming mainly from the seams of the human skull, and the first Hindu characters are said to have been traced with his finger on leaves of gold. The Greeks claimed that their alphabet was given to them by Cadmus, their national hero, who brought it with him from Phoenicia. In this legend there is truth, for the Greek alphabet was inspired by the Phoenician. Many other peoples believed in the divine origin of writing.

Over a period of a little more than 5000 years, many methods and systems of writing have been devised, been used for awhile, and then disappeared, or so altered that it is difficult to see the ancestral form in present day script. However, the knowledge of the development of writing is on firmer ground than the development of speech, for archeologists have discovered many records and traces which reveal the story.



North American Indian Picture Writing on Buffalo Hide

How Scripts Developed

Man's first attempt at writing is called picture writing and the figures produced are **pictograms.** The result is a number of simple pictures strung together to convey a sequence of events or story. Picture writing can usually be understood by anyone regardless of language, since it depicts ideas rather than sounds. The writing of the North American Indians was at this stage until fairly recent times, and primitive tribes can still be found who use this method of communication. Its limitations are that only objects can be adequately shown. Such words as "heat," "wet," "sweet," and the like cannot be expressed by pictures.

The next step, **ideographic** writing, evolved directly from pictograms. Expedience and speed in execution caused the pictures to become less realistic and more stylized. Of even greater consequence, when some pictures came to stand for more than just the object shown, an important advance was made. A picture of the sun, for example, came to mean "warmth," "light," or "day"; the eye came to mean "see," "look," or, with lines radiating downward from it, "weep," or "tears." Some agreement among the peoples using these symbols is implicit, of course. A writing system based on ideograms must, of a necessity, consist of an enormous number of characters and is, therefore, a great burden on the memory.

When man first thought of making symbols stand for sounds rather than ideas, he probably applied the simple and familiar game of rebus. To use an improbable English example, a symbol for "tree" plus a symbol for "sun" can be combined to mean "treason." When sound symbols, or **phonograms,** are introduced into any writing system—even when used as a supplement—it is possible to increase the scope of written expression enormously. In time, in all pictographic and ideographic systems, the meanings of the signs receded and individual symbols came to be associated with sounds rather than ideas. Most ancient writing systems—Egyptian hieroglyphic, the cuneiform of the Near East, and Chinese—used a combination of ideograms (idea symbols) and phonograms (sound symbols).

Two systems of phonetic writing developed—the syllabary and the alphabet. The syllabary, which was first to evolve, derives from the idea that all words are capable of being divided into syllables, either open—

ma, de, ro, en, op—or closed—*men, bon, mar, den*. A simple English word **fa-mi-ly** shows how easily a syllabary is constructed. Some languages are well adapted to this form of writing, but English would be difficult, because so many words have consonants strung together. Thus, "strong" would have to be written **se-te-ro-ne-ge.** Most syllabaries originated in languages which were strong in consonants and weak in vowels, and this resulted eventually in the gradual reduction of syllabic symbols used from in the range of about 100 to about 30. This was achieved by rejecting all symbols which represented syllables with more than one consonant and vowel, and allowing one consonantal symbol to stand for a consonant ending with any vowel—thus, *m* could become or mean *ma, me, mi, mo,* or *mu*. This streamlining the Near Eastern syllabaries brought about the eventual creation of the true **alphabet.**

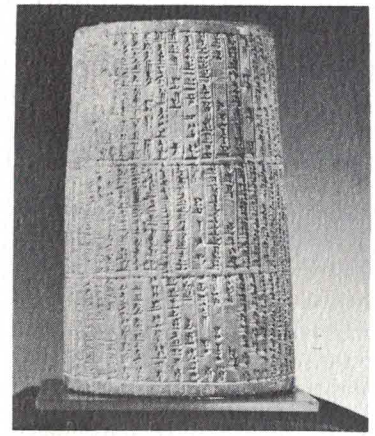
An alphabet is unique in that, unlike a syllabary, the sounds of the consonants and vowels are separated, thus making it possible to represent each single sound, whether consonant or vowel, by a single and unchanging symbol. It is also distinguished by the fact that each symbol has a name. Generally, it can be deduced that any unknown script is an alphabet if it has 30 or less symbols. Of course, alphabets must be adapted to individual languages, as each uses a variety of different sounds, and not necessarily the same ones. A glance at any comparative list of alphabets will reveal this. The Hebrew alphabet has 22 letters; Greek, 24; Arabic, 28; Latin, 23. Among modern languages, Russian has 31 letters; English, 26; and German, 29, if the "a," "o," and "u" modified by the umlaut are counted.

Many things influenced the written speech that developed in various parts of the world. The languages spoken, the materials available for writing, and the cultural aspects of each civilization, all contributed to the type of writing which evolved. One condition, apparently, was that peoples had progressed to an urban situation. Of all known peoples who had achieved this state of civilization, only one, the Inca of pre-Columbian Peru, had not devised some form of writing. However, they had perfected a very complex system of keeping records on knotted cords called quipus. In almost all cases, the beginnings of writing seems to have originated in the need for temple personnel to keep records of their god's business. From that point, its use spread to many other purposes: governmental, economic, and finally literary.

Writing in the Near East

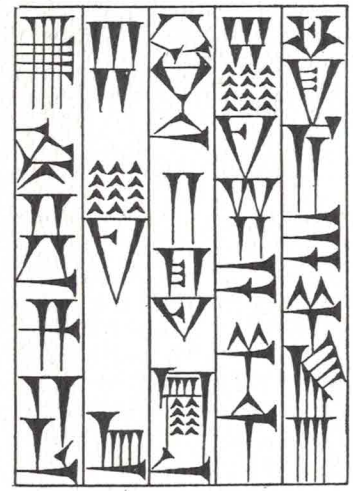
In ancient Mesopotamia, the earliest evidences of writing are found in the Sumerian script discovered at Uruk, the Erech of the Bible, located northwest of Ur. Several archeological strata make it possible to follow the development of this writing. The lowest, from about 3500 B.C., produced pictographic writing without ideograms. The next layer, only about 200 years later in time, yielded tablets with writing already in a transitional stage, containing both ideograms and phonograms. The script at this early period was not cuneiform but linear, that is, written in simply drawn lines. Fortunately, the medium for this writing was stone and clay.

Thin biscuit-shaped cakes of the latter, which was in abundant supply in Mesopotamia, were used for records, and since clay is nearly imperishable, even when not baked, thousands of examples of early script remain. In time, because wet clay is a difficult material to work, especially for drawing curved lines, the scribes began to **impress** the characters on the tablets instead of scratching them on the resisting surfaces. The result was short, straight strokes in vertical, horizontal or oblique position, which are called **cuneiform** or nail writing. It was done with a stylus, a broad-headed instrument which the scribe is usually represented as holding in his closed fist. Though no object has yet been found which can certainly be identified as this kind of stylus, it can tentatively be reconstructed from pictures. However, no one today is sure of the exact shape of the writing tip.

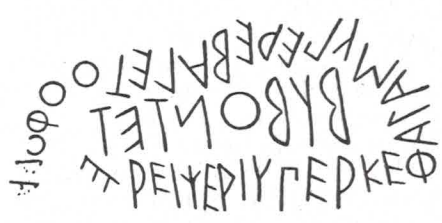


Babylonian Nebuchadnezzar Cylinder Covered with Cuneiform Script

The Rosetta Stone Showing Script in Hieroglyphic, Demotic, and Greek, *top to bottom*



Code of Hammurabi in Cuneiform



Greek Boustrophedon Writing

That it was made from a hard-sheathed, tough-fibered reed is implied from the Assyrian name for it, "tablet-reed." The material apparently could not stand up to long use without blunting its edge, and a "reed-stone," probably a pumice stone, was kept for sharpening it. It was probably the custom to carry the stylus in a case which was tucked in the sash or waistband to insure that its edges and point suffered no damage. Wood or bone may have furnished the material for this tool. The direction of the writing on the clay tablets was from left to right in order to avoid smudging what had already been put down.

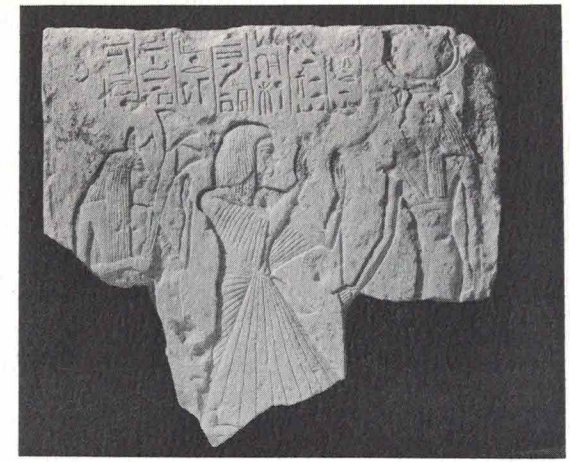
The Sumerians were a non-Semitic people who dominated the Mesopotamian area for about 1500 years. After their power yielded to that of the Semitic, Akkadian-speaking peoples we know as Babylonians and Assyrians, cuneiform was adapted to their Semitic languages and remained in use in some form for over 2000 years. The new users were traders and conquerors and their script spread throughout the Near East, being adapted in the process to many languages. Its final loan, at about 700 B.C., was to the Persians who created a simple phonetic syllabary in cuneiform, of forty-one signs, which came very close to being an alphabet. From about the fourteenth to twelfth centuries B.C., cuneiform actually was used in an alphabet of 32 signs in ancient Ugarit, a trading center on the Syrian coast. This alphabet was short-lived, however, coming to an end when Ugarit declined. It was probably inspired by already existing linear alphabets.

The Elamites, inhabitants of an ancient country north of the Persian Gulf and east of the Lower Tigris, also had an indigenous script which was linear and geometric and most certainly derived from pictographic symbols. It was written from left to right and probably related to the original Sumerian script. However, about the middle of the third millenium B.C., they too, adopted the Babylonian cuneiform with alterations and simplifications.

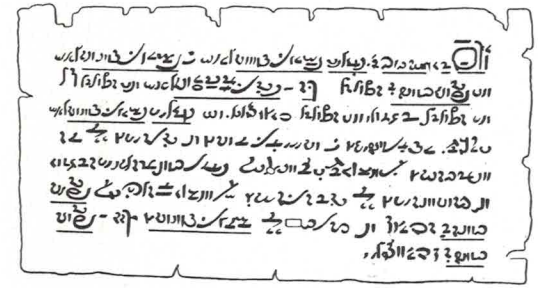
After being the dominant script in the Near East, outside of Egypt, for about 3000 years, cuneiform was completely superseded by linear scripts at about the time of Christ. Better writing materials and the fact that the Babylonian language had ceased to be spoken at around 500 B.C. probably contributed to the decline of this interesting script.

Writing in Ancient Egypt

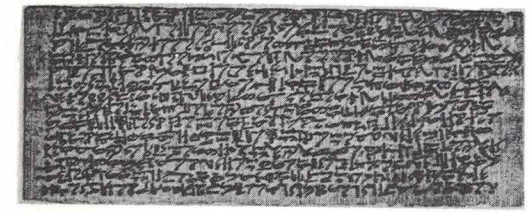
Writing apparently developed from the need to record the seasonal rise and fall of the Nile, an essential knowledge for planting in ancient Egypt, as well as from the need for other temple records. Like cuneiform, Egyptian *hieroglyphic writing* became a widespread and important script in the ancient world. Its name means "sacred carved letters" in Greek, though the Egyptians called it "speech of the gods." There is no record of its growth from a pictographic form, so it is probable that the idea of writing became known from Mesopotamian sources, and a script was created to suit the Egyptian concept of writing. The earliest known hieroglyphics, from about 3100 B.C., are already in a transitional stage, partly ideographic and partly phonetic. Shortly after 3000 B.C., this picturesque and precise script



Egyptian Hieroglyphic Writing

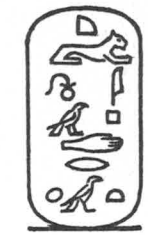


Egyptian Demotic Writing



Egyptian Hieratic Writing

Cartouches of Cleopatra, *left*, and Ptolemy, *right*



Egyptian God Thoth as a Scribe

set into a pattern which remained basically unchanged for 3000 years. The structure of the language is such that the beautifully drawn basic symbols are supported by auxiliary signs of an explanatory nature resulting in a style of writing of a mixed character which seems to us repetitive and redundant. Twenty-four of the characters are phonetic consonants which could have actually served as an alphabet, but, because of a devotion to tradition or a desire of the scribes to keep writing complex and mysterious, they were never used as such. In a well-known example, the Cleopatra and Ptolemy cartouches, in addition to the phonograms which literally spell the names, other symbols, which are ideographic, were used to qualify the names as "royal" and "female" or "male."

As its name implies, hieroglyphic writing was used for sacred inscriptions, temple records, and royal and funerary texts. However, it was difficult to reproduce, the figures needing care and precision in the rendering. Therefore, a more cursive or flowing form of script, called *hieratic* or priestly writing, was used along with hieroglyphics from the First Dynasty onward. Basically, it was an exact transcription of hieroglyphic script, the only modification being in the subtle blurring of the signs which was inevitable as they were executed with a brush pen. As centuries passed, hieratic writing became less pictorial and more cursive until, by the seventh century B.C., it was almost obscure. Also, hieratic, originally executed in vertical lines, in time became horizontal, and it was written from right to left. Meanwhile, from about 700 B.C. on, another even more modified form of it, known as *demotic*, from the Greek *demos*, meaning people, was used for private and business correspondence, and for literature. It is even more cursive than hieratic and whole groups of hieratic characters were fused into single demotic signs. Demotic writing, hieroglyphic, and Greek were the three scripts used on the Rosetta Stone—the key which proved so useful in the deciphering of Egyptian hieroglyphic writing, and which was found by Napoleon's soldiers during his expedition in Egypt.

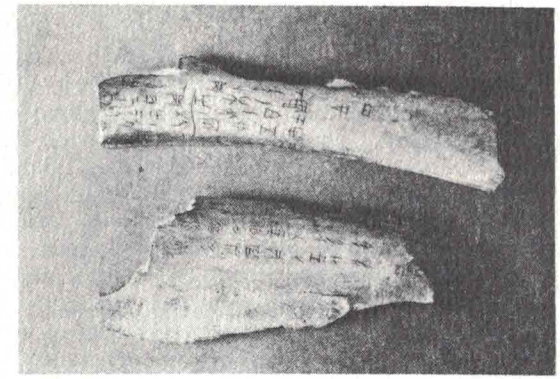
In about 2500 B.C., the Egyptians invented an excellent writing material—*papyrus*. This paper-like material was made from the papyrus plant, a giant swamp grass growing in the Nile delta region and cultivated by the Egyptians. This versatile product was used for ropes, sails, clothing, and mats, and it also could be eaten. The process of converting papyrus into a writing material consisted in removing the pith from the stalks, then cutting them into thin, wide strips which were placed in rows close together. These were treated with a paste made of flour and boiling water, and another layer running crosswise to the first was placed over it. The two layers were then beaten into a thin sheet which, after drying in the sun, was polished by rubbing with agate or smooth shell. This writing material, cheaper and more plentiful than *parchment*, made of animal skins, became an important Alexandrian industry. Two important writing tools were also invented by the Egyptians: the reed brush, made by fraying the end of the reed, and the reed and quill pens, made by shaping the end of the reed or quill in much the same form as our present pens are shaped. Egyptian characters were inscribed by dipping the reed point in a mixture of water, gum, and lampblack—the earliest known form of ink.

As with cuneiform, the Egyptian forms of writing were lost when the language ceased to be spoken about the first century A.D. It is possible, however, to trace in the Coptic alphabet a few signs representing sounds which are not included in Greek characters.

Writing in China

The Chinese also probably obtained the idea of writing from Mesopotamia. However, the Chinese script is quite distinct from any other in that it has remained in a state of arrested development, still depending

Chinese Characters



Earliest Form of Chinese Writing on Oracle Bones

largely (though not entirely) on ideographic symbols, now very much conventionalized but still possible to trace back to the original pictographic form. Chinese characters are word pictures and their written language has no alphabet or spelling. Writing probably started in China late in the third millenium. Some of the most ancient examples are found on bones dating back to about the eighteenth century B.C., called oracle bones and presumed to have been used for divination. It is possible to see in the carved characters the forms from which current symbols, now executed with a brush, were derived.

There is an enormous advantage to the Chinese in this ideographic type of writing, clumsy as it is. It has played a vital part in unifying a vast country in which many dialects are spoken, since all of its peoples can understand written Chinese even if their local speech is mutually unintelligible. This also applies to neighboring Asiatic countries whose writing systems are based on Chinese ideograms. The limitation of this script lies in the large number of characters which need to be memorized. By the tenth century these numbered approximately 44,000. Subsequent modernization of the script brought this huge number down to about 8000 in current use. A kind of basic Chinese for popular use has developed which involves only about 600 to 1000 of these characters, but even this number is unwieldy and makes the extension of literacy to the common people very difficult.

Paper, the most useful material ever invented for writing, was given to the world by the Chinese. Almost two centuries before Christ, a high grade paper made from silk reduced to pulp was developed. However, in 105 A.D. a cheaper paper made from cotton was made available. Knowledge of this useful material spread throughout China and, by the seventh and eighth centuries, to Korea and Japan and as far west as Persia. The Arabs, in the twelfth century, brought it to Europe where parchment, invented in the second century A.D. at Pergamum in Greece, had been used. Movable type, first made of wood, also was invented by the Chinese early in the thirteenth century. Less than 200 years later,

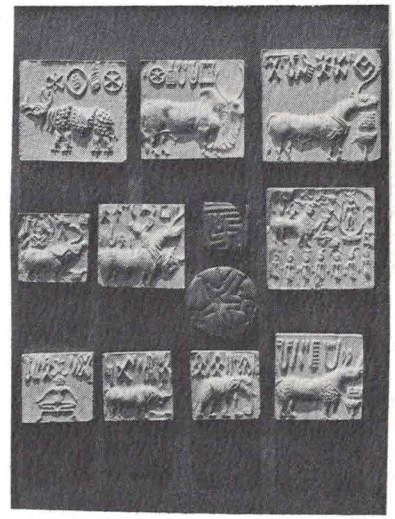
another Asiatic country, Korea, began to cast type in bronze. This invention, moving faster than that of paper, appeared in Europe by the mid fifteenth century.

The Japanese began to adopt Chinese writing sometime around the third of fourth century A.D. The adaptation of this script to their spoken language posed many problems. There is a very great difference between the two languages, since Chinese tends to be monosyllabic and without grammar, and Japanese is polysyllabic with many grammatical parts. The Japanese resolved this difficulty by using the Chinese characters as a syllabary of sorts assisted by ideograms. Both Chinese and Japanese symbols are produced with a brush and ink, the script running vertically from right to left in Chinese. The Japanese may follow the same form, or the lines may run horizontally, and in that case may be written in either direction (that is, right to left or left to right). Paper was introduced to Japan in the sixth century, and by applying Chinese methods to pulp from the bark of the paper mulberry, the Japanese produced an excellent paper of their own.

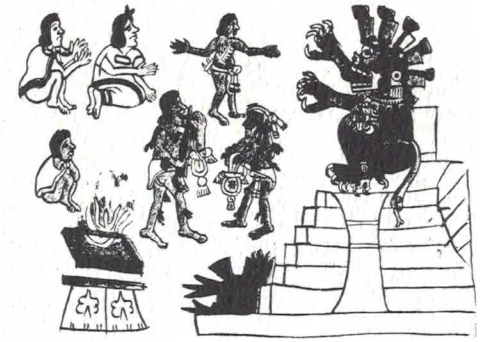
Other Pre-Alphabetic Writing Systems

Other civilizations of the ancient world worked out methods for recording their words. The Minoans of ancient Crete had risen to a cultural level comparative to that in Egypt and Mesopotamia. Seals with decorative picture symbols appeared as early as the twenty-eighth century B.C., but it was not till the beginning of the second millenium that inscriptions began to appear on tablets. The symbols were partly ideographic and partly phonetic, likely a syllabary. The direction of the writing was from left to right, or from left to right and right to left in alternate lines, a form called boustrophedon or "as the ox plows" which is what the Greek term means. About 1600 B.C., this script gave way to another more cursive one, named Linear A by its discoverers. It is still undeciphered. Finally a third script, named Linear B was found, dating from the thirteenth century B.C. When

Easter Island Writing on Boards



Indus River Valley Script on Seals



Example of Aztec Picture Writing

this was deciphered in 1952, our concept of Minoan history changed considerably. Previously, it was believed that the Cretans had carried their civilization to Mycenae in Greece. With the discovery that the script of Linear B was really Greek, and the discovery of tablets in the same script at Mycenae, the picture changed. It is now believed that the Mycenaeans conquered Crete in about 1400 B.C. and introduced their script which continued to be used till the destruction of Minoan culture in about 1100 B.C. Linear B is a cursive script running from left to right with the lines of writing separated by guide lines. In the symbols, forms can be recognized that resemble some of our modern letters which also came from the Greek.

The civilizations at Mohenjo-Daro and Harappa in the Indus River valley also produced writing. It is known only from a few beautifully constructed seals decorated with animal figures and inscribed with a script which cannot be deciphered. Here, too, the idea of writing probably was inspired by a knowledge of writing in Mesopotamia. Surprisingly, a much later, comparatively primitive script written on boards resembles it. These were found on Easter Island, but there is no reason, other than resemblance, to believe that there is any connection between the two.

In the New World, writing developed from pictograms and probably it can never be proved that it originated as a result of borrowing from any other writing system. Very sophisticated carved symbols are frequently found on Maya monuments, and they appear to be concerned primarily with dates (which were apparently a preoccupation of these peoples who had also invented a very fine calendar). The same type of writing was also painted on strips of bark-cloth sized with lime. Long strips of this painted cloth were folded like a screen to form pages, which were fastened at one end to a thin rectangular sheet of wood, brilliantly varnished. Thus, the whole presented the appearance of a book without a back. Some knowledge of the Maya calendar, and the glyphs or pictographic symbols of the days and the 20-day month is known, but the rest of the script is undeciphered at present. Unfortunately, the key to this script was literally in the hands of the conquering Spaniards, but they, in their bigoted religious zeal, destroyed almost all written traces of this pagan civilization, never appreciating the unique value of these records.

The neighboring Aztecs had a form of pictographic writing, which probably resulted from a knowledge of writing among the more civilized Mayas. However, almost all of the symbols are pictures of one kind or another; therefore, Aztec writing is considered picture writing rather than

true writing, though there is some evidence of the use of phoneticism in the rendition of personal and place names.

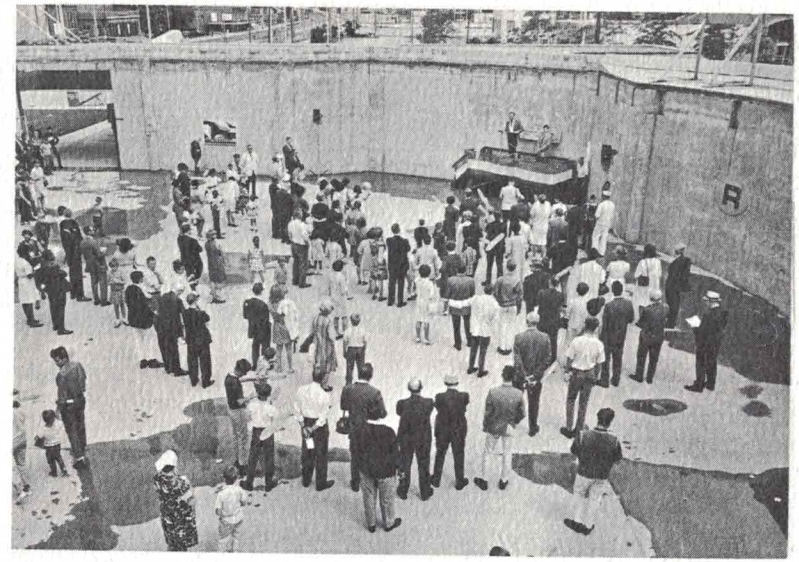
The Alphabet

The region of Palestine and Syria was the most logical and likely location for the invention of the alphabet, the method of writing which made it possible to represent each individual sound by a single symbol. Throughout its history this area served as a bridge between the great civilizations to the east and west of it—Mesopotamia and Egypt. It served as a trading center, and certainly its merchants and scribes had to be familiar with the current scripts of all their neighbors. The peoples of Canaan, as far as we can tell today, were already trying to reduce their syllabic scripts as early as the sixteenth and fifteenth centuries B.C. By reducing the symbols of certain of their syllabic symbols to stand for the phonetic values of their initial consonants, they had by 1100 B.C. achieved a consonantal alphabet of 22 letters, as demonstrated by a number of inscribed artifacts belonging to those times. Thus "beth" became "b"; "gimel" became "g"; "lamed" became "l"; and "mem" became "m". Phoenician traders were the first to carry this new and valuable invention to other lands where it was readily adopted for other spoken languages because of its simplicity.

Several branches of this script appear to have developed. There is a southern Semitic alphabet which seems to have influenced the languages to the southwest of its homeland, resulting ultimately in the scripts for northern African languages such as Ethiopic and Amharic. The north Semitic alphabet appears to be broken into two families, the Aramaic and the Canaanite. The Aramaic gave birth, in time, to the Arabic and Hebrew scripts. The Canaanite, through the Phoenician, influenced the Greek script, and thereby, fathered all of the current western alphabets.

By the tenth or ninth centuries B.C., the Greeks had added a new idea to the Phoenician alphabet, which as we have mentioned before, was a consonantal alphabet. Because they did not have sounds in their language for five Phoenician characters, they changed them to vowels. Thus "aleph", "he", "waw", "yod", and "ayin" became "alpha", "epsilon", "upsilon", "iota", and omicron". There were other alterations, including a rearrangement of the order of the letters, and the addition of symbols for Greek sounds not included in the Phoenician language. The Greek alphabet eventually comprised 24 letters. The earliest inscriptions found show the direction of the writing running from right to left; this was succeeded by the boustrophedon. Occasionally the script ran from the bottom of the page to the top. However, by 500 B.C., left to right and top to bottom became the established order which was followed.

The spread of the alphabet throughout the world and the various types of scripts it has fostered is a large subject worthy of separate treatment. The influences of other inventions, such as printing, and the much more recent electrical inventions—the telegraph, telephone, radio, and television—also have had an enormous impact on the communication processes, and should be given separate consideration.



Milwaukee Journal photo.

THE OPENING DAY GUESTS

THE WISCONSIN REGIONAL SPACE CENTER TEMPORARY EXHIBIT AREA

by ROBERT A. THOMPSON, Director W.R.S.C.

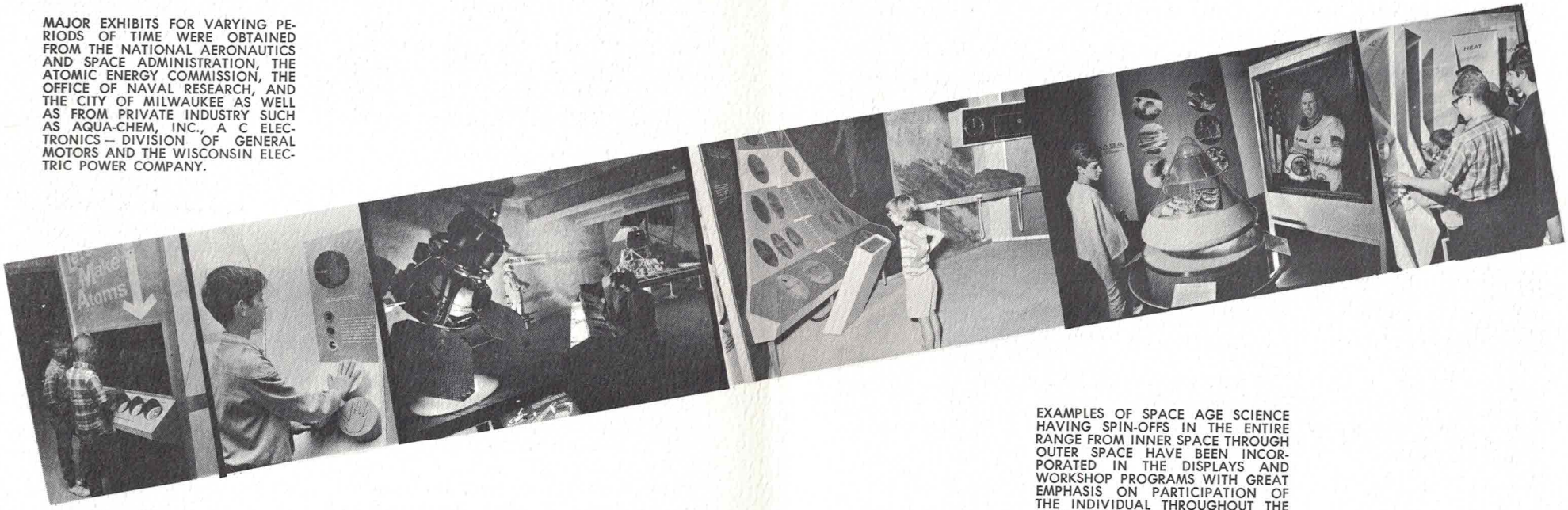
With Resolution 67-1034, the Common Council of the City of Milwaukee in July, 1967 provided an area in the MacArthur Square Civic Center Plaza to be designated for the Milwaukee Public Museum's Wisconsin Regional Space Center (WRSC). Since a portion of the space was already constructed, it was decided that a Temporary Exhibit Area be opened to allow the public to preview some of the exciting concepts that are envisioned for the World's First Regional Space Age Science Educational Research Center. The opening, sponsored by Aqua-Chem, Inc., took place July 7, 1968. In the short interval between then and Labor Day more than 100,000 people visited the Center. The Atomic Energy Commission (AEC) assigned their Exhibits Manager David N. Jenkins to the WRSC program from July, 1968 through January, 1969 to conduct workshops, lectures and civic programs.

The AEC brought in a model of their nuclear desalting and electrical generating complex along with their "Radiation and Man" exhibit which assisted us in relating Aqua-Chem's exhibit showing the production of fresh water from sea water and the Wisconsin Power and Light Company's Two Rivers Nuclear Power Station model, thus tieing in the future Matter and Energy and the Biological-Environmental Dem-Par area concepts to the future Space Center. The AC Electronics—Division of General Motors, National Aeronautics and Space Administration and the Office of Naval

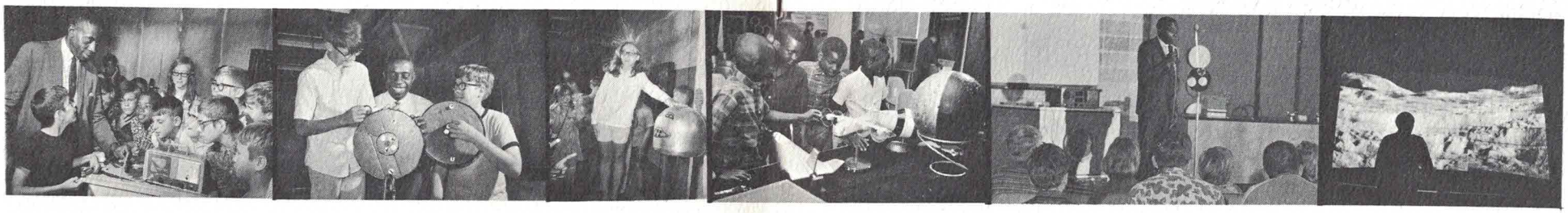
continue on page 20

Milwaukee Journal photo.

MAJOR EXHIBITS FOR VARYING PERIODS OF TIME WERE OBTAINED FROM THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, THE ATOMIC ENERGY COMMISSION, THE OFFICE OF NAVAL RESEARCH, AND THE CITY OF MILWAUKEE AS WELL AS FROM PRIVATE INDUSTRY SUCH AS AQUA-CHEM, INC., A C ELECTRONICS – DIVISION OF GENERAL MOTORS AND THE WISCONSIN ELECTRIC POWER COMPANY.



EXAMPLES OF SPACE AGE SCIENCE HAVING SPIN-OFFS IN THE ENTIRE RANGE FROM INNER SPACE THROUGH OUTER SPACE HAVE BEEN INCORPORATED IN THE DISPLAYS AND WORKSHOP PROGRAMS WITH GREAT EMPHASIS ON PARTICIPATION OF THE INDIVIDUAL THROUGHOUT THE EXPERIENCE.

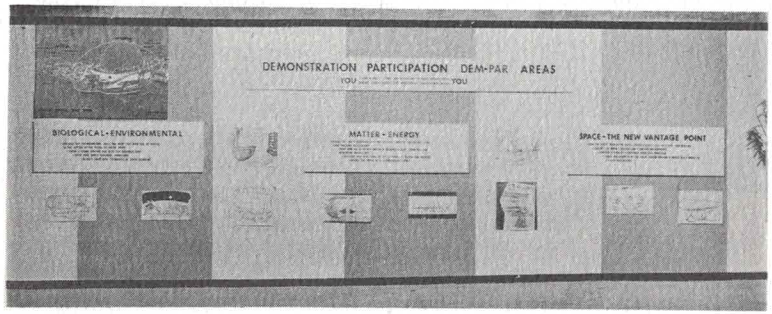


Milwaukee Journal photo.

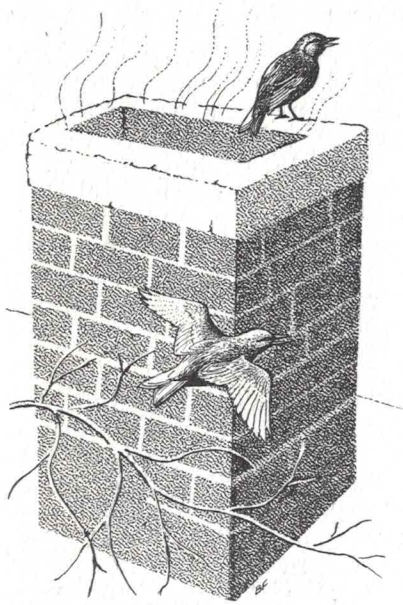
Research exhibits relate techniques for probing both "outer" and "inner" space using Surveyor, Lunar Orbiter and Apollo full scale models for spaceflight and Alvin for oceanographic research, thus relating the importance of the future Dem-Par area, Space . . . The New Vantage Point. Movies and free booklets in addition to lectures, student and teacher workshops and school programs have been scheduled daily to provide a link to the fascinating today and tomorrow that yesterday's efforts have brought, in attempts to motivate our visitors of all ages to greater aspiration in the future.

The Space Center display consists of items included in the proposed Center's plans ranging from oceanology, geology, meterology, and spaceology. It also shows views of the uniquely designed (Dem-Par) Demonstration-Participation Units that will involve—YOU—(all five senses) to feed information into the unit and require reasoning power to determine satisfactory results. The units will be geared to various educational levels from the novice to the professional.

The completion of the Space Center depends upon contributions from private and industrial sources. The City of Milwaukee has invested two-thirds of one million dollars in the present construction and during 1967, the United States Government spent $74,000 in the specialized planning for the proposed Space Center. It is estimated that 2.9 million dollars will be needed to complete this program. The Space Center, if it is to be completed, needs your help and support now to help instruct you and your children in the future.



SPACE CENTER DISPLAY IN TEMPORARY EXHIBIT AREA



A "TAIL" OF TWO STARLINGS

by
WALLACE N. MacBRIAR, JR.
Asst. Director

Illustration by Robert Frankowiak

Warming one's "derriere" before the flames of the open fireplace hearth was once a welcome relief for many of us "old timers" after coming in out of the winter's cold. This bit of posterior pleasure has been lost somewhat with the advent of efficient central heating, except for people at their hunting lodges in northern Wisconsin perhaps. Some species of birds enjoy this fanny warming treat, too, notably the European Starling, *Sturnus vulgaris*, who individually or severally collect around chimney openings during cold winter days to absorb the warmth coming from the heating plant below. I obtained two interesting banding recoveries of this species due to this acquired habit.

In our home we have a dual purpose chimney the same stack exhausting the fumes from both our gas furnace and a living room fireplace. On one cold morning early in March of 1963 I descended the stairs to the first floor, opened the drapes in the living room and dining room, and was gathering together the preceding evening's sections of newspaper for deposit to the pile in the back hall when I became aware of a rustling noise. I could not locate it immediately but soon determined that it must be coming from above the fireplace within the chimney. Knowing the

rump warming habits of starlings, I suspected that one had been overcome by the fumes and had dropped into the fireplace portion of the chimney. Since the supposed bird was fluttering, I thought this would be a dandy way to capture it for banding purposes.

During the winter when the fireplace was not in use it was our habit to close the draft to prevent all the warm air of the living room from being drawn up the flue. Therefore, I opened the damper carefully to keep from exciting the bird unnecessarily and closed the metal curtain to prevent what probably was a dirty bird from escaping and soiling the furniture of our living room. I stepped back from the fireplace to see what would happen and within seconds the bird, a starling as I had suspected, fluttered down to the fireplace grate. I quickly assembled my banding tools, opened a band, and captured the bird. To my complete surprise the bird already possessed a band (542-75860). A check of my records showed that it had been captured in a trap in our back yard on December 9, 1961, a year and a quarter before.

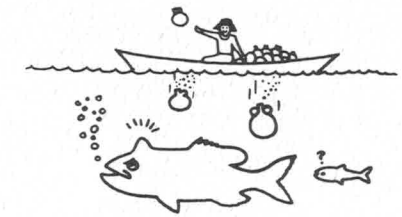
In my excitement of this odd recovery, I awakened the family who proved to be not quite as excited as I about the capture. Finally after verifying the band number and recording information concerning the capture, I released the bird from our front porch. I came back through our living room, bent on completing the task I had started out to do and then to eat breakfast when "what to my wondering ears" came the sound of more rustling in the chimney. Did that silly bird go right back up to that chimney again and drop in? Possible but hardly probable. It must have been a second bird perhaps falling in at the same time as the first but overlooked in the process of removing the original.

Having closed up the flue, I repeated the process of opening the damper closing the fireplace curtain and stepping back to wait for the result. This one was a little more cagey! But after a few minutes it, too, dropped down to the grate and was easily extracted though dirty with soot. The improbable had happened—the starling was banded! I fumbled the band thinking that it was the same individual extracted a few minutes before, having made a quick trip from our porch to the chimney top and down again.

But, to my amazement, this banded individual was a different bird (542-75877). It had been banded, again in our backyard trap, just a year before on April 14, 1962. Again the data was recorded and this bird released.

Is that the end of our tale of two starlings? No not quite.

A year later on May 8, 1964, while raking the lawn, I came across the fresh carcass of a starling. The bird was banded. It was our old friend 542-75860 who had lived at least three and a half years, probably enjoying fanny warming at the opening to our dual fireplace/furnace chimney. The chimney has been operated in the same manner each winter since the original visits, but we have never had another occurrence of a starling drop-in.



POT - POURRI

To an archeologist, the pot
Has intriguing connotations.
Is it truly pre-Columbian
Or a horrid imitation?
Where was it found? Way underground?
Or at what elevation?
Or tossed to the gods as a dugout bobbed
On a lake old as creation?
Was it a plate, or vase, or jar?
Probably or perhaps.
Fluted or carved in ways bizarre
Then hauled on native backs?
Their dig's defined by the tautened twine
For stratographic mapping.
And the polychrome, or the rhino bone
Are missed if he is napping.
A different kind of a dish he dates
With methods analytic,
By radio-active carbon traits
To frustrate every critic.
Each sherd assigned its proper place:
Late Classic, Post, or Middle,
Where's the magic in a pot?
That's the basic riddle.
O some men seek their Shangri-la,
On fillys cast their lot.
But eager archeologists
Will still pursue the pot.

—Leo Johnson
Museum Photographer

Illustrations by author

THE WIND GOD'S BREASTPLATE

by
STEPHAN F. BORHEGYI,
Director

Figure 1: Quetzalcoatl, the Mexican god of wind and learning, wearing around his neck the sign of the wind god, the "wind breastplate" *ehecailacocozcatl*, "the spirally voluted wind jewel," made of a conch shell (illustration copied from the *Codex Borbonicus*, p. 22, by Milwaukee Public Museum artist Lee Tishler).

Any student of mythology knows that the many *gods* in the various religious pantheons of the world, as represented in sculptures, paintings, and in manuscripts, can be identified by their attributes: that is, by special symbols, articles of clothing, and objects carried in the hands. The science that concerns itself with the study of such attributes is called *iconography* or *iconology;* the knowledge (*logos*) of meanings to be attached to religious pictorial representations (*icon*). A lamb with a flag on a painting is a simple problem in Christian iconography, but many of the complicated allegories are now almost beyond interpretation.

Archaeologists and iconographers studying the remaining representations of the extremely complex, pre-Columbian Mexican pantheon have even more difficulty in identifying specific Mexican gods than the iconographers working with Christian symbolism. This is true because there are few descriptions of these deities, and in many cases their attributes are missing.

One of the iconographically better-known gods of the pre-Columbian Mexican (Aztec and earlier) pantheons was Quetzalcoatl, the god of wind, of life, and of the morning star; god of the planet Venus, of twins, and of monsters. As the god of life, Quetzalcoatl appears as the constant benefactor of mankind. He discovered corn and gave the grain to man. He taught man how to polish jade, how to weave, and how to do mosaic work with feathers. But above all, he taught man science, thereby endowing him with the means to measure time, and study the movements of the stars. He taught him how to arrange the calendar, and devised ceremonies, and fixed certain days for prayers and sacrifices. In short, Quetzalcoatl was the very essence of saintliness; his life of fasting and penitence, his priestly character, and his benevolence toward his children, mankind, are evident in the material that has been preserved for us in the sixteenth century Spanish chronicles and in the picture writings of the indigenous manuscripts.

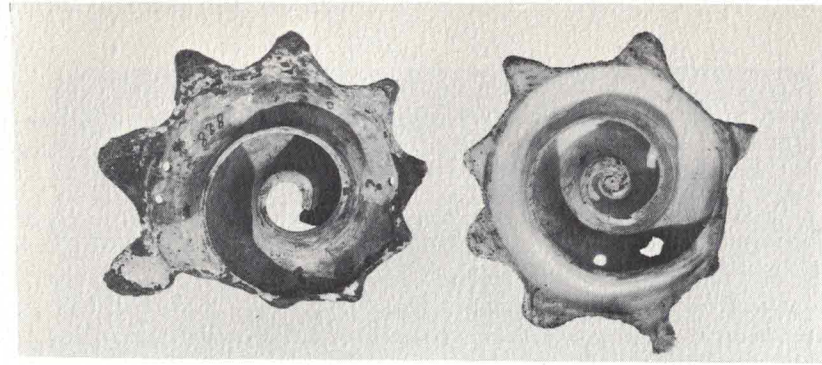
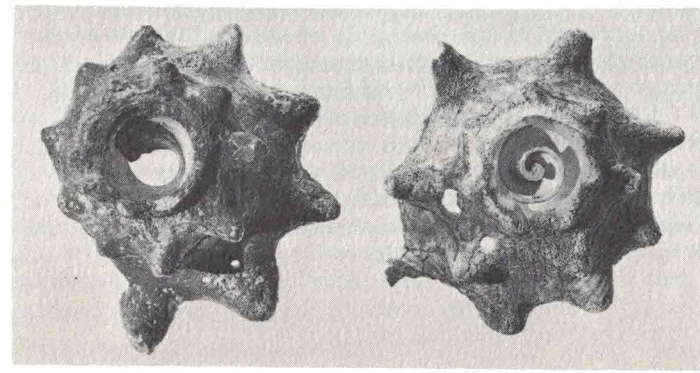


Figure 2a: Front view of two star shaped shell ornaments made by cutting across the upper portion of a marine shell (*Strombus gallus*, from the Caribbean Sea). The one on the left is from Chalco, Mexico. As the emblem of the wind god Quetzalcoatl, it was probably worn suspended on the neck of the high-priest of Chalco, during the latter part of the fifteenth century. It was originally stuccoed with pink and white paint. Diam: 11'5 cm. H: 3 cm. The conch shell on the right, also in the form of the sign of the wind god, is a recent one cut with modern tools by William Dickinson, Curator of Lower Zoology at the Milwaukee Public Museum, to demonstrate the way the specimen on the left was made.

Alfonso Caso's iconographical description of the god Quetzalcoatl, as he appears in a painting in the *Codex Borbonicus*—a pre-Columbian codex or picture writing book, now in the library of the Chamber of Deputies in Paris—shows the complicated attire of this god, and the many attributes he carries, all of which have had to be analyzed and identified by the iconographer.

"The body and face of the god are painted black, since he was the pre-eminent priest and the originator of the self-sacrifice, which consisted of drawing blood from the ears and other parts of the body by pricking them with *maguey* spines and eagle or jaguar bone needles. Hence we see a bone in his headdress, from which hangs a green band terminating in a blue disk, the symbol of the *chalchihuitl*, "the precious liquid," human

Figure 2b: Back view of the unworked sections of two marine conch shells, illustrated in *Fig. 2a.*



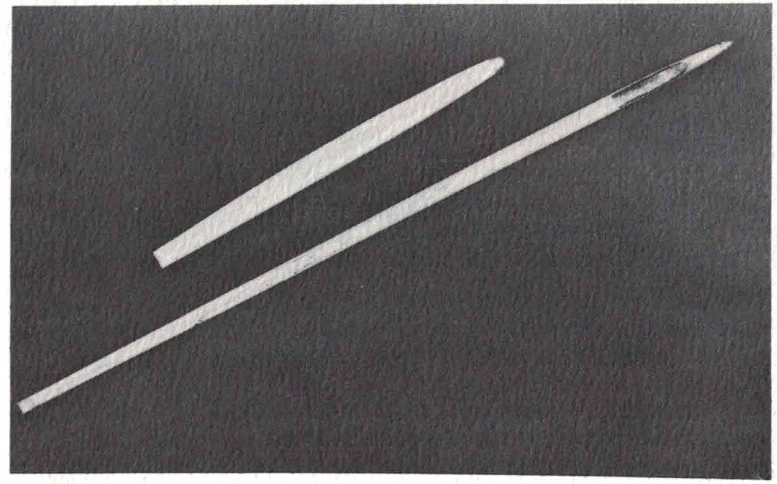
blood. As further sacerdotal attributes, he carries in one hand an incense pot with a handle in the form of a serpent and in the other a bag of *copal* incense."

"Covering his mouth there is a red mask in the form of a bird's beak. This mask identifies him as the god of wind, in which form he was worshipped under the name of *Ehecatl*, meaning "wind."

"On his head he wears a conical cap made of *ocelot* (or jaguar) skin; it is tipped with a turquoise ornament and held in place by a tuft made of loops. The breastpiece edged with shells, the bracelets, and the ankle bands are likewise made of *ocelot* skin. His breastplate, called *ehecailacacózcatl*, or "breastplate of the wind", is formed by the transverse cut of a large sea shell, and his earplug is a turquoise disk from which hangs a red tassel and an object of twisted shell called *epcololli*, "twisted shell." (Quotations after Caso, 1958, *The Aztec: People of the Sun*, University of Oklahoma Press, pp. 21–23.)

What is of particular interest to us in this painting of Quetzalcoatl, is the breastplate he wears on his chest. This breastplate, the insignia of the wind god, called in Nahuatl the *ehecailacacózcatl* (the "spirally voluted wind jewel"), was made by cutting across the upper portion of a marine conch shell, and drilling holes for suspension by a cord. Such conch shell breastplates were hung either on the sculpture of the god himself or were worn by the high priests, the earthly representatives of this god. According to such sixteenth century Spanish authorities as Fray Bernardino de Sahagun, "the title of Quetzalcoatl was reserved for the high priests or pontiffs" among the Aztecs and other inhabitants of Mexico. Only they were entitled to wear the emblem of *ehecailacacózcatl*, the insignia of this god. Such marine shell breastplates are, therefore, extremely rare. Of the few that survived the Spanish Conquest, most were destroyed by overly zealous friars and only a handful have been turned up by archaeologists. Understandably, the surviving few "spirally voluted wind jewel" breastplates number among the most highly prized possessions of the museums which house them.

The Milwaukee Public Museum is extremely fortunate to possess one of the rare shell breastplates. It was donated to the museum in 1900 by Mr. W. S. Wymann who obtained it in Mexico in the little town of Chalco. This town, located on the edge of Lake Chalco near Xochimilco, is today only a few miles southeast of the metropolis of Mexico City. When the "uncivilized" Tenochca-Aztecs arrived at nearby Lake Texcoco around 1250 A.D., Chalco was already an important and flourishing Nahua city state. For 200 years the Chalcas and Xochimilcas successfully resisted the ever encroaching Aztecs. However, after various unsuccessful battles with such Aztec emperors as Itzcoatl (1428 A.D.–1440 A.D.) and Moteczoma I. (1440 A.D.–1469 A.D.), the *Chalcas* finally gave up and about 1450 A.D. acknowledged Aztec supremacy. To commemorate their victory the Aztecs built a temple in Chalco and dedicated it to Quetzalcoatl. It is entirely possible that the shell "wind breastplate" now in the Milwaukee Public Museum actually hung on the breast of the high priest of Chalco during the dedication ceremonies of this temple.



Snow snakes.

HUNG YU

by BEN HUNT Honorary Curator of Anthropology

Illustrations by author

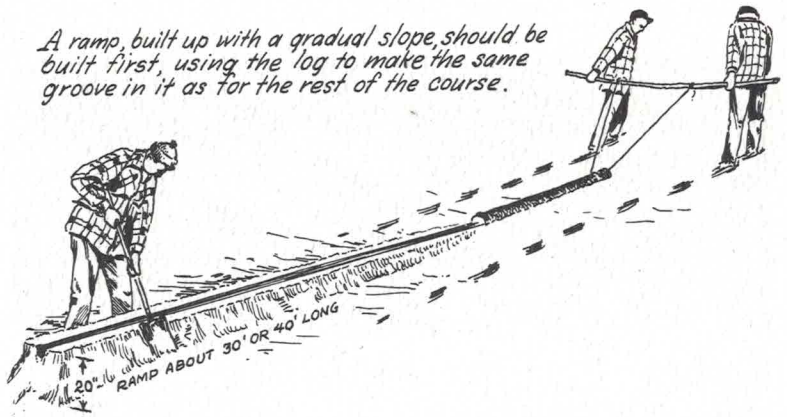
Should you be at the source of this call on a crisp winter day you would witness the most amazing exhibition of an object propelled by a human hand—namely, a Snow Snake; and, strangely enough, probably not one person in a thousand has ever heard of one.

The measured distance of a golf ball drive of 420 yards was made by George Bayer. The record flight of an arrow, free style (using the feet) is 937 yards. A baseball? Well that is about one-third the distance of the golf ball when batted and that takes a pitcher and a batter to do it. A Snow Snake can travel a mile or more.

The game of Snow Snake was played by various Indian tribes long before they ever saw a white man, but for unknown reasons the game had fallen by the wayside until around the early 1930's, when it was revived by an old Indian of the Six Nations Tribe near Ohswekan, Ontario, Canada. He was the father of either Albert or Joe Porter or Laurence Johnathan, and he showed these boys how to build Snow Snakes and throw them. Today the headquarters of the sport is on the banks of the Grand River on the Six Nations Reservation, near Brantford, Ontario.

Making a good Snow Snake is a lengthy job. The material is usually an ironwood, hickory or maple sapling, which is peeled and shaved down to the proper dimensions. Sizes vary, depending on their use, from six to seven feet for the most part. The short, night Snow Snake will be explained later.

The average Snow Snake is about $1\frac{3}{16}$" wide by $\frac{5}{8}$" thick over the forward end and it tapers gradually to $\frac{1}{2}$" by $\frac{1}{4}$" at the tail which is

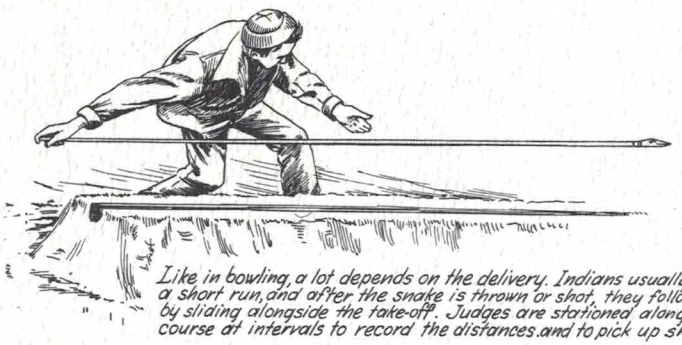


A ramp, built up with a gradual slope, should be built first, using the log to make the same groove in it as for the rest of the course.

slightly cut out to fit the forefinger. Heads are carved or whittled, as shown in the accompanying illustrations. The head is shaped first and the body is carefully planed and sanded. The entire Snake is left to soak in an oil bath for about a year. It is then gone over, trued up and balanced very meticulously by pouring lead into holes or grooves in the head to give added weight.

Today, as a rule, the Snakes are first finished with several coats of French-Polish of orange shellac and linseed oil applied with a soft rag and rubbed in with plenty of elbow grease until dry. Now comes the finish that can win or lose a game. Every Indian has his own special wax, the secret of which is often handed down from father to son, and which is applied just before throwing the Snake. There are Snakes and waxes for cold weather and for mild weather when the snow is slightly soft; there are Snakes and waxes for the days when the snow or track is fast and when it is slow. There are Snakes for every contingency, and experts in the game have as many as thirty (fifteen pair) of Snakes. They usually carry them in long, cloth bags with individual compartments for each Snake. (I might add here that when not in use, the Snakes are hung in a cool dry shed.) Experts wear clean canvas gloves when waxing and handling Snakes in a contest.

The course or track is the next important thing that has to be considered. Snow Snake tournaments are the big winter events and are usually run when there is about two feet of snow on the ground. The course is usually made along a straightline-fence or road. Two men carefully drag a six inch log, ten to twelve feet long, in as straight a line as possible for a mile to a mile and a half. This makes the course down which the Snakes slide. It is carefully swept free of any possible chunks of snow or ice, and while this is being done, other men are preparing a thirty to forty foot ramp, about 1½ to 2 feet high, tapering down to the track level. This ramp is also grooved with the same log and smoothed carefully. The course is *never* iced. It is usually fairly level, but it may have some slight ups and downs and long curves at times. Snakes deflected by a chunk of ice or snow have been known to break through the wall of snow and go sailing forty feet into the air. They have also been known to pierce a boot when so deflected.



Like in bowling, a lot depends on the delivery. Indians usually take a short run, and after the snake is thrown or shot, they follow thru by sliding alongside the take-off. Judges are stationed along the course at intervals to record the distances and to pick up snakes.

In a tournament each player has two throws. He holds the tail with his forefinger in the nock and his thumb and second finger grasping the sides. The Snake is rested on the outstretched fingers of the gloved left hand and the delivery is somewhat similar to that of bowling or pitching a softball underhand. It is said that the Snake is sometimes thrown overhand, but I cannot see how that can be done expertly enough for a good takeoff. The player usually takes a short run and follows through in various ways. Some even clown it up and turn summersalts after throwing. But the delivery is all important including a wild "HUNG YU!"

The speed of the snakes has been clocked at 120 miles per hour and three-quarters of a mile is an average throw. The record is said to be one and one-half miles.

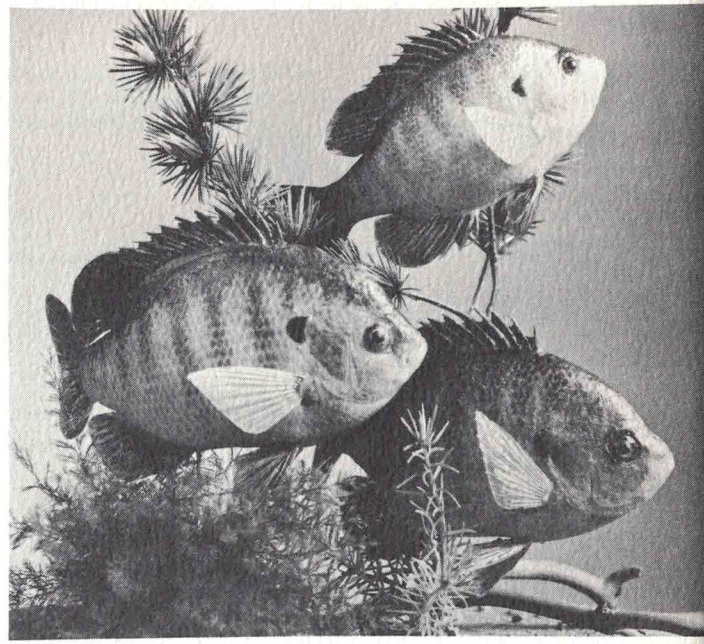
The Snake I have was beautifully made by Albert Porter who presented it to me through an old Scouting friend, Walter Schoof, one time Postmaster of Imlay City, Michigan. It is such a beautiful piece of craftsmanship that I keep it in my living room.

One day as I was leaving my backyard log cabin, the snow seemed to be perfect for trying out my Snake. I laid it down and gave it a shove, using only my forefinger. From where I stood to my back fence is about 150 feet. The Snake took off like something alive, went through the fence, through prickly ash brush and down to the creek which was another hundred or more feet away.

The short Snake shown in the photo was picked up by Dr. Robert Ritzenthaler at the Grand River Reservation in Ontario. These were played at night by lantern light. The track was either horseshoe shaped or round, according to the terrain, and the object was to throw it to go the full distance and return to the player. This probably eliminated a lot of stumbling around in the dark which would happen in following it along a straight course. The maker said it was played in pairs, similar to the manner in which the big Snakes were played.

That's all—*Gagwane!*

FOCUS ON FISH



A group of Bluegills of fiberglas by artist Robert Frankowiak.

by ROBERT FRANKOWIAK, Museum Artist

A brief review of the Milwaukee Public Museum's techniques in the preparation of fishes during the past 70 years.

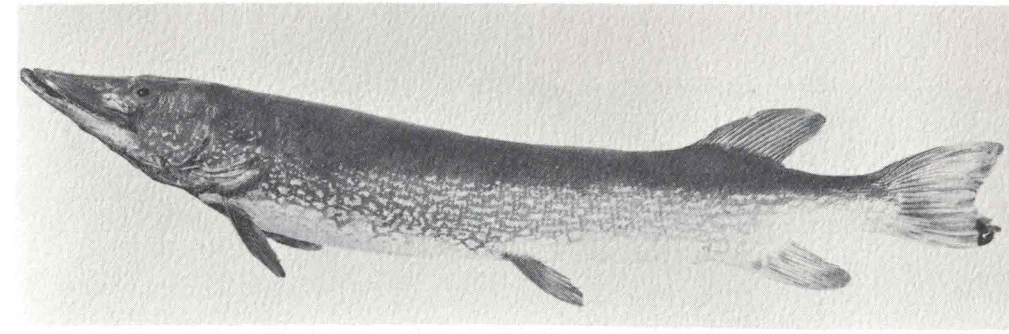
The present Museum collection of fish numbers well over three hundred and fifty specimens. The types of fish, some of which were mounted over seventy years ago, range from minnows to sharks. The Museum acquired most of the fish from private donors, financed expeditions, or state fish hatcheries. The latest acquisition, the Opah, an ocean moonfish, was purchased from Japan.

Many of the fishes are not in the best condition for Museum display, because most were mounted in the old conventional manner.

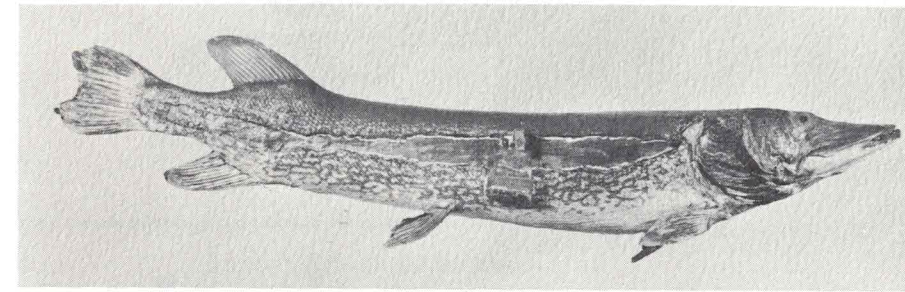
In the old days, a fish was collected, skinned, glued to a form and painted according to the highest standards of fish taxidermy practiced at the time, but this method had its drawbacks.

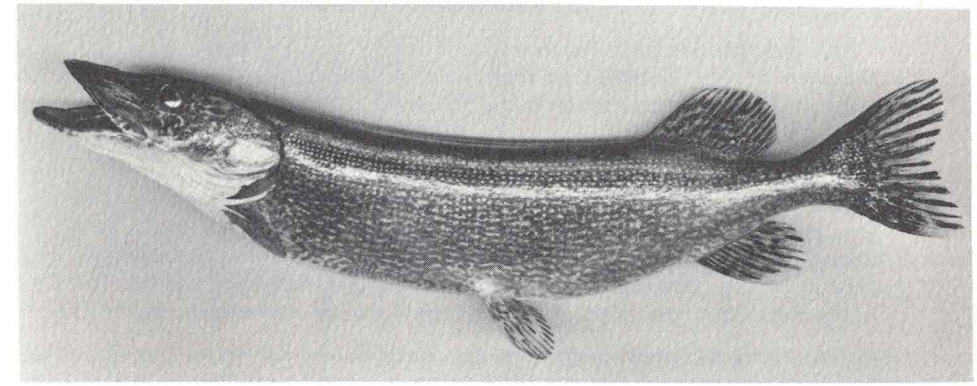
The aging process took its toll on the specimens. Paint began to check and peel, fins became brittle and broke, grease began to ooze from the skin, and scales lifted, all of this making the fish look very unappealing.

This problem had been recognized over forty years ago, but substitute methods for preserving fish were difficult to conceive. Some fish were molded in plaster, or wax, or celluloid plastic. Each method had its limitations. Plaster and wax were fragile or heavy and the celluloid impressions would not show enough detail.

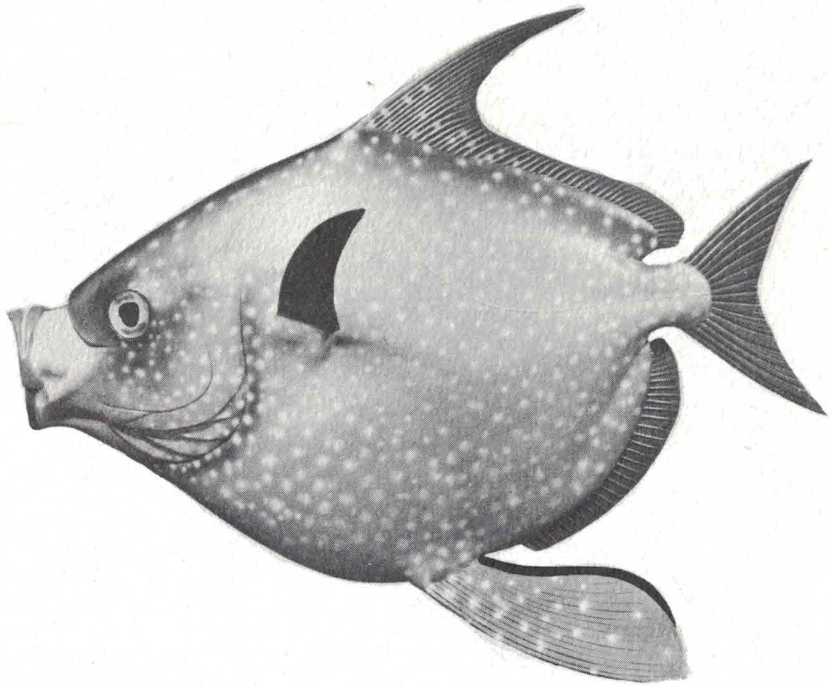


This skin mount of a Northern Pike showing deterioration of fins and skin was mounted in the early 1900's. The back view shows how fish was tacked to wood form.





Here is a Northern Pike made entirely of indestructible plastic. Fins and tail are flexible, permitting easy handling.



This Opah, an ocean moonfish, was sculptured in clay and cast in fiberglas by taxidermist Harvey Mayer.

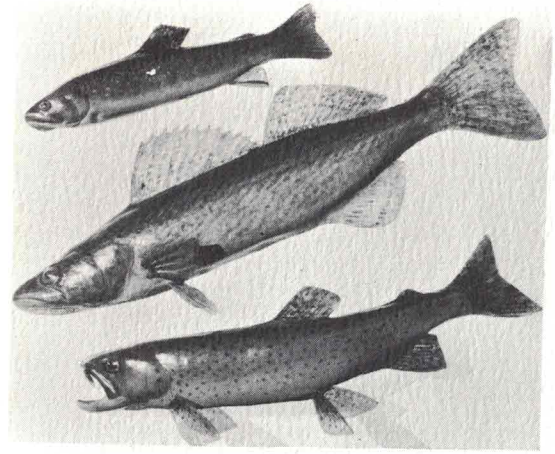
The advent of new plastics in present years has contributed to the success of making accurate and detailed replicas of fish. Mr. William Dickinson, Curator of Lower Zoology, has kept abreast of recent plastic developments and has aided other staff members with experimentation in this field. The Museum fish collection is now in the process of renovation, and adaptation to the use of plastics has already begun.

Mr. Adolph Seebach (now retired) was one of the first artists at the Museum to use fiberglas in making fish and reptile replicas. His work inspired further experiments to improve methods and techniques.

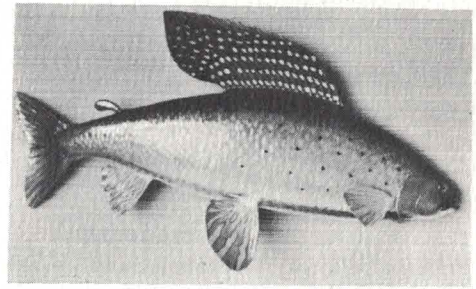
Taxidermist Harvey Mayer and artist William Schultz have also employed various techniques in making fish replicas. Mr. Schultz has experimented with carving balsa wood bodies of fish, attaching only the real fins, and has been very successful, especially with trout. Mr. Mayer, an adept sculptor, has molded many fish in plaster, wax, and plastic from clay originals. Interest is high in making good fish replicas, for most of our preparators are avid fishermen and luckily sometimes catch fish.

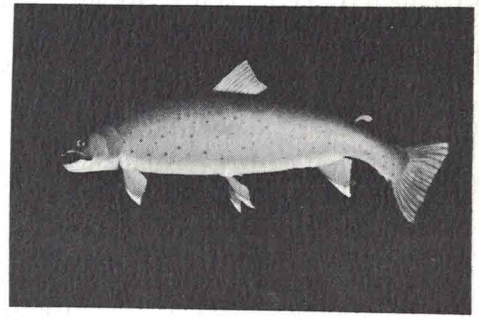
The Museum always welcomes the donations of fish to add to the collection, especially record game fish, and we are hoping that a record coho salmon will someday enhance a Museum display.

Good fishing to all coho fishermen!

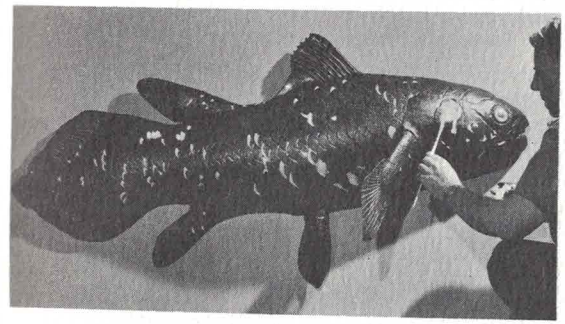


Some early plastic replicas of fish were molded by artist E. R. Tyrell 40 years ago.





Artist William Schultz carved balsa wood bodies and head for the grayling and Dolly Varden.



Mr. William Dickinson, Curator of Lower Zoology, prepares model of Coelocanth which is cast in fiberglas.

Adolph Seebach, sculptor and artist, experimented with new plastics on fish and reptiles in the late fifties.

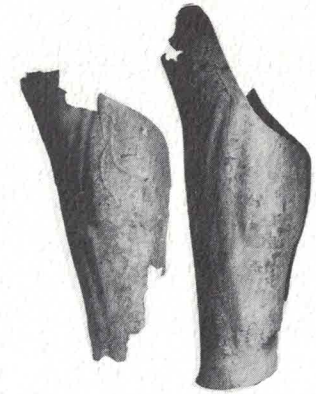
Dance of the fans performed for FOM at special opening.

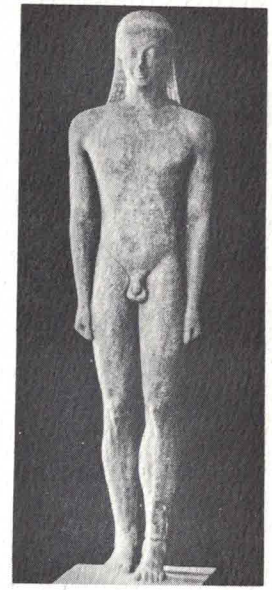
KOREAN PURCHASE

Over 50 items representing both historical and cultural Korea were recently acquired for the Milwaukee Public Muesum through the efforts of FOM board member, Carl Moebius. Presented to the Milwaukee community, the Korean collection is currently being displayed in the Museum Masterpieces area of the west wing, first floor.

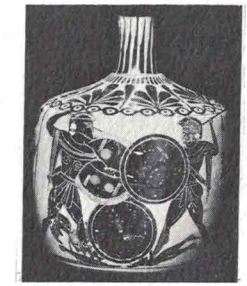
Valued over $16,000, donations for its purchase are being solicited and should be earmarked: Korean Collection, FOM Opportunity Fund.

John Luedtke, acting curator of Oriental, Classical and Decorative Arts, said of the acquisition of pottery, costume, paintings and furniture, "An important void in the museum's Korean collection has been filled by this acquisition. The paintings are the first to be added to the museum's collection. They span several years and represent a variety of Korean art—scrolls, ancestor portraits and screens. Especially significant in the acquisition are several early pieces from the Silla Dynasty (5–6th century A.D.) a few important later pieces from the Koryo Dynasty (12th century) and an excellent assortment from the Yi Dynasty (15–16th century)."





Body proportions.



How armor was worn.

F.O.M. OPPORTUNITY FUND SPECIAL GIFT

The style and technique of the Greek bronze corselet correspond well with the physique of sculptured figures of youths found in the Ionian world of sixth century B.C. The treatment of the chest, stomach muscles, navel, and lines of the groin are characteristic for this period. The physical types which the statues portray correspond to the long narrow skull which the helmet was to fit. The greaves (leg defenses below the knees) were made to fit the large heavy legs, and the corselet (cuirass) to cover a slim torso. Most of the early Greek warriors did not exceed 5' 6" in height.

The armor needed some repair and restoration. The cheeks of the helmet were missing entirely. Evidence of their previous existence was indicated by scars and partially remaining hinges. To complete the specimen it was necessary to fabricate replacements. A search for a correct design led to illustrations of similar examples on Greek pottery of the period. Sheet metal was used to simulate the originals. Hinges were not replaced. Instead, the restored elements were held to the inner surface with epoxy cement. A later application of paint created the proper appearance for display.

The cuirass, consisting of well preserved breast and back plates, needed no restoration. The greaves needed some work to make them stable. The original metal was so cracked that an application of epoxy was needed. This was applied on the inner surfaces and allowed to flow into the cracks for strength. All repairs and restorations were painted and are barely discernible. None of the original surface was altered.

SHOP INTERNATIONAL FOR CHRISTMAS

Bring the world to your friends at Christmas time. The museum's Shop International again offers a wide variety of intriguing and eye-catching gifts and decorations from foreign and unusual places. Go Mexican with colorful pottery bowls, vases and figurines; or select hand woven and embroidered textiles from Guatemala—scarves, belts, shoulder bags, and aprons. For the extra special gift, there are rich and excitingly designed Navaho rugs in colors to match many decors; or unusual Spanish plaques, candle holders and bookends. Your may want to choose an exotic foreign doll from Poland, Portugal, Greece, Argentina, India, Jerusalem or Guatemala. Exquisite objects of handcrafted art, jewelry, desk pieces, boxes, and antique reproductions from China, Egypt, India, and Spain are also to be found at a wide range of prices to fit any shopping list.

Plan to decorate your home with conversation pieces for the holidays. Set out a gayly colored, ten-piece, woven creche set from Ecuador; a tree of life from Mexico; or bedeck your Christmas tree with tiny Ecuadorian dolls depicting religious figures—the three Kings, Madonnas, and the Christ Child. Or you may prefer beautiful traditional ornaments from Germany, Poland, and the Scandiavian countries.

Haymarket Square, the little 1890's shop on the Streets of Old Milwaukee, offers a variety of reproductions of antique toys, candle holders, beeswax candles, perfumed soap, bottles, trivets, tiles, and other items to delight the collector of that period.

Again, through your FOM membership, you get a year-long gift of a 20% discount on your purchases, and the satisfaction of an out-of-the-ordinary shopping trip.

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LORE

WINTER, 1968