Music Ages a Thousand Years

It's not as though there is a great surfeit of experts on ancient Babylonian cuneiform, but there are even fewer scholars familiar with ancient Babylonian mathematics. Thus, a homely clay tablet discovered around the turn of the century and which appeared to be a crude math textbook sat for decades collecting dust in a drawer because the few researchers available simply assumed that they would not understand it.

The tablet itself was unimposing. Originally, it contained six columns of cuneiform text, three to a side. However, when archaeologists from the University of Pennsylvania found it at Nippur, for centuries the cultural center of Mesopotamia, all that remained was part of one side. Into the drawer it went, where it remained for almost six decades.

Finally, somebody looked. Dr. Anne Draffkorn Kilmer, from the University of California at Berkeley, decided to publish the tablet simply as "Two Lists of Key Numbers for Mathematical Operation." It was while peering at a specially made photo of the tablet that she noticed that while the second and third columns of markings were indeed mathematical, the first column was something else, apparently having to do with the strings of musical instruments.

"What was being given," she says, "seems to be the string names together with their numbers and their relationship to other string names, or possibly to certain stringed instruments." Her clue to this deduction was that certain of the strings were referred to as "four behind" and "three behind," which reminded her of another tablet excavated 30 years before in which the same terms were used in reference to a particular nine-stringed instrument.

Musical instruments were by no means unknown in Mesopotamia, which included Sumer and Assyria, as well as Babylonia. Lyres and harps from there have been known for many years, and one king named Shulgi boasted of being able to play the three-necked lyre as well as at least 10 still unidentified instruments.

But Dr. Kilmer is a cuneformist, not a musicologist, and the tablet was laid away again. This was the last time it would ever be casually put aside. For the crude scratchings on the dusty tablet have now been found to have added a thousand years to the history of music.

Dr. M. Duchesne-Guillemin first got her hands on the tablet in 1962. A musicologist from the University of Liege in Belgium, she was spending the year in America with her husband, who was a guest lecturer at the University of Chicago. Through her own interest she began looking at photos of the tablet; then an official from the University of Pennsylvania museum brought her, by hand, the relic itself.

Like the top-secret cryptographers of World War II, she began trying to crack the tablet's code, aided by Dr. Kilmer's translation. She noted that

University of Pennsylvania Museum

Music moves back a millennium.

the first and second numbers of every odd line in the first column formed a regular progression: 1-5, 2-6, 3-7; and 4-1, 5-2, 6-3, 7-4. This succession of three jumps of five and four jumps of four suggested to her the tuning of a stringed instrument. For example, today's violin is tuned in fifths, and the bass viol in fourths. One of the strings was described on the tablet as "thin," and this suggested a half-tone situated between the third and fourth strings.

The key was found when Dr. Duchesne-Guillemin recognized that the notes (1-2-3-4-5-6-7) were numbered differently than the strings (1-2-3-4-5-4-3-2-1). This indicated to her that the eighth and ninth strings were equated with the first and second, which meant not only that the makers of the tablet had an organized hepatonic, or seven-note, scale, but that they possessed the rather sophisticated idea of octaves.

Previously, scholars had thought that music began a millennium later, in ancient Greece. Even the word's Latin root, musa, had a Greek root, mousa. Thus a crumbling bit of clay, virtually ignored for the better part of a century, has added 10 times that period of years to what is now seen as one of the world's most ancient arts.

New Hormone Class

Most neurosecretory—or brain—hormones, instead of acting directly on body organs, travel first through the pituitary gland.

The science of neuroendocrinology which deals with these substances is only a decade old. In that time, hormones that deviate from this rule have never emerged. One that does would suggest whole classes of hormones never before known.

And such a hormone, one that bypasses the pituitary altogether, has now been discovered. This one—called sialogen—is produced in the hypothalamus at the base of the brain and works directly on the salivary glands.

It has stirred up considerable interest among scientists who reason that if the hypothalamus is making one hormone that stimulates a gland directly, it is probably making others. Neurosecretory hormones may be playing a role in the regulation of blood pressure, respiration and other biologic functions.

Sialogen was discovered by Dr. Susan Leeman of Brandeis University, Waltham, Mass., who reported her findings to the Federation of American Societies for Experimental Biology meeting in Chicago last week. It was discovered, she says, in the course of research on another hypothalamic substance.

Dr. Leeman and graduate student Richard Hammerschlag ground up hypothalamic tissue from 2,000 cattle and processed it to get the hypothalamic extract. When they injected one factor of this extract into rats, the animals began to "blurble saliva all over the place."

In one experiment, the researchers injected sialogen into rats whose pituitary glands had been surgically removed. The hormone stimulated salivation and proved it could carry out its task without the help of the pituitary.

Sialogen has not yet been identified in the blood, where most hormones are found, but is considered a hormone on the basis of its activity.

Dr. Leeman's work is an important addition to the search for biochemical links between brain and body; a search that relies on understanding the chemical activity of the brain. Scientists have known for 30 years that there are chemical channels of communication in the brain, and this activity has become an area of increasing research interest. Numbers of recent investigations have shown that the pituitary, once considered the master gland, is really under the control of the brain and further, that this brain control is chemical in nature.